

National Park Service
U.S. Department of the Interior

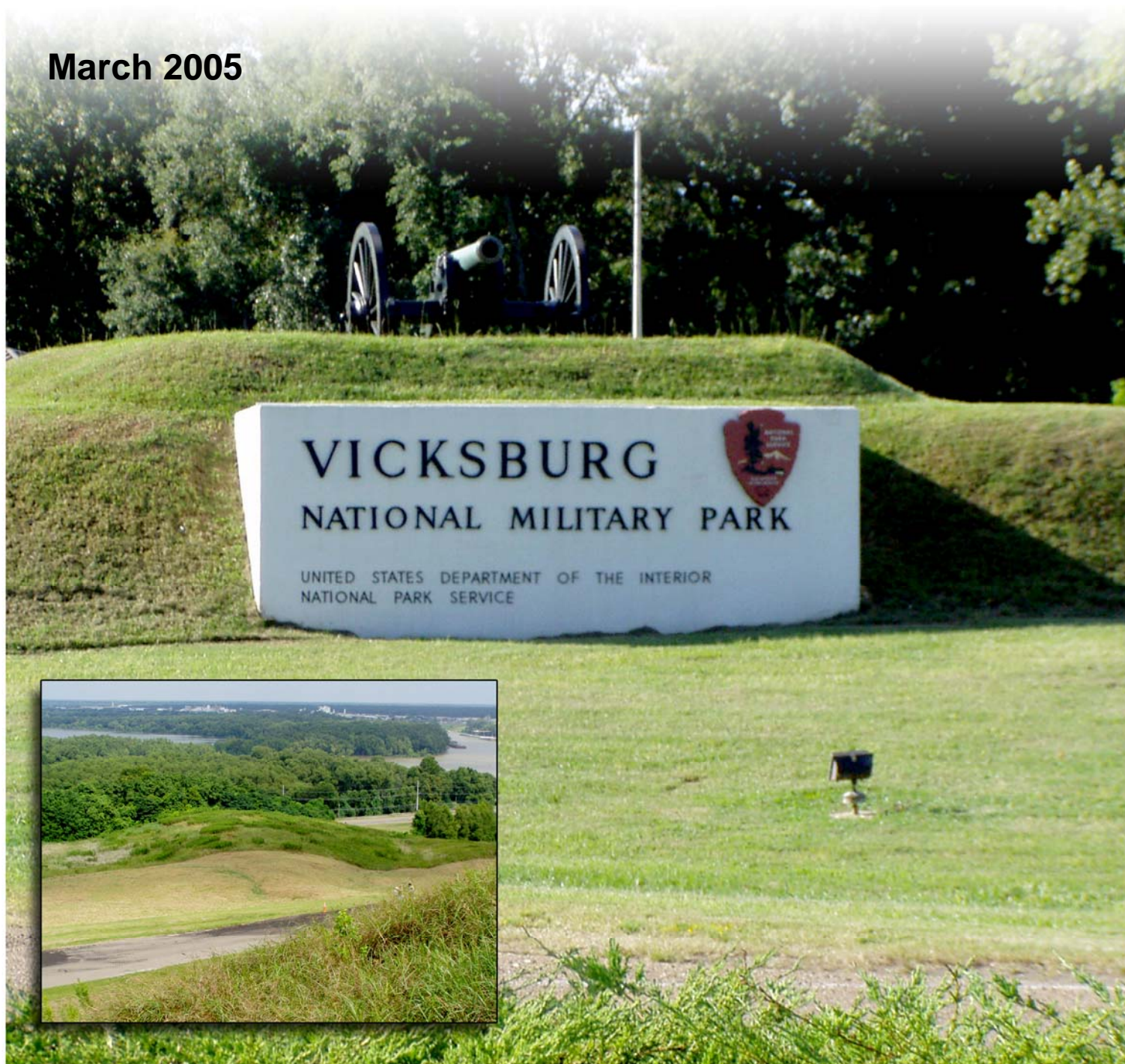
Vicksburg National Military Park
Vicksburg, Mississippi



Vicksburg National Military Park

Environmental Assessment Repair of Tour Road on Connecting Avenue

March 2005



ENVIRONMENTAL ASSESSMENT
REPAIR TOUR ROAD ON CONNECTING AVENUE
FOR THE
VICKSBURG NATIONAL MILITARY PARK

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Vicksburg, Mississippi

United States Department of the Interior • National Park Service

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**U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
ENVIRONMENTAL ASSESSMENT
FOR THE
REPAIR OF TOUR ROAD ON CONNECTING AVENUE
VICKSBURG NATIONAL MILITARY PARK
VICKSBURG, MISSISSIPPI**

Summary

The National Park Service proposes to repair and stabilize Connecting Avenue to provide a sustainable solution that would prevent further erosion of Fort Hill within the Vicksburg National Military Park in Vicksburg, Mississippi.

This Environmental Assessment analyzes the potential impacts of two alternatives (a No-Action Alternative and one action alternative) on the human environment in accordance with the National Environmental Policy Act of 1969. Under the No-Action Alternative, the slumping of Fort Hill from erosion would continue causing Connecting Avenue to continue to buckle. For the action alternative, the NPS would correct the slumping of Fort Hill by installing a shear key buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress, and it would outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

The No-Action Alternative and the action alternative would either have negligible or no impacts on floodplains; air quality; wildlife & threatened and endangered species; soundscape management, lightscape management, historic structures/sites, archeological resources, museum objects; ethnographic resources; Indian Trust resources; socioeconomics; land use; environmental justice; parks & recreation; community facilities & services; and infrastructure.

Under the No-Action Alternative, there would be moderate long-term adverse impacts on the cultural landscape; safety; and visitor use and experience. There would be minor to moderate long-term adverse impacts to geology, topography and soils; and park operations. Minor long-term adverse impacts would occur to wetlands; groundwater and surface water; and vegetation.

Under Alternative B (Preferred Alternative), there would be moderate long-term beneficial impacts and minor short-term adverse impacts to the cultural landscape; and visitor use and experience. Minor long-term beneficial and minor short-term adverse impacts would occur to vegetation. Minor long-term beneficial impacts to wetlands would occur. Moderate long-term beneficial impacts would occur to safety and park operations. However, minor to moderate long-term, adverse impacts would occur to geology, topography, and soils. Minor long-term beneficial and adverse impacts are anticipated to occur to groundwater and surface water.

Note to Reviewers and Respondents

If you wish to comment on this Environmental Assessment, you may mail comments to the name and address below by April 14, 2005. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we would honor to the extent allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses and from individuals identifying themselves as representatives, officials, organizations, or businesses available for public inspection in their entirety.

Please address all comments to:
Monika Mayr, Superintendent
Vicksburg National Military Park
3201 Clay Street
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or by e-mail to:
kurt.foote@nps.gov

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PURPOSE OF AND NEED FOR THE ACTION

The National Park Service (NPS) is proposing to the repair and stabilize Connecting Avenue and to implement a sustainable solution to prevent further erosion of Fort Hill adjacent to Connecting Avenue within the Vicksburg National Military Park in Vicksburg, Mississippi. (see Figure 1).

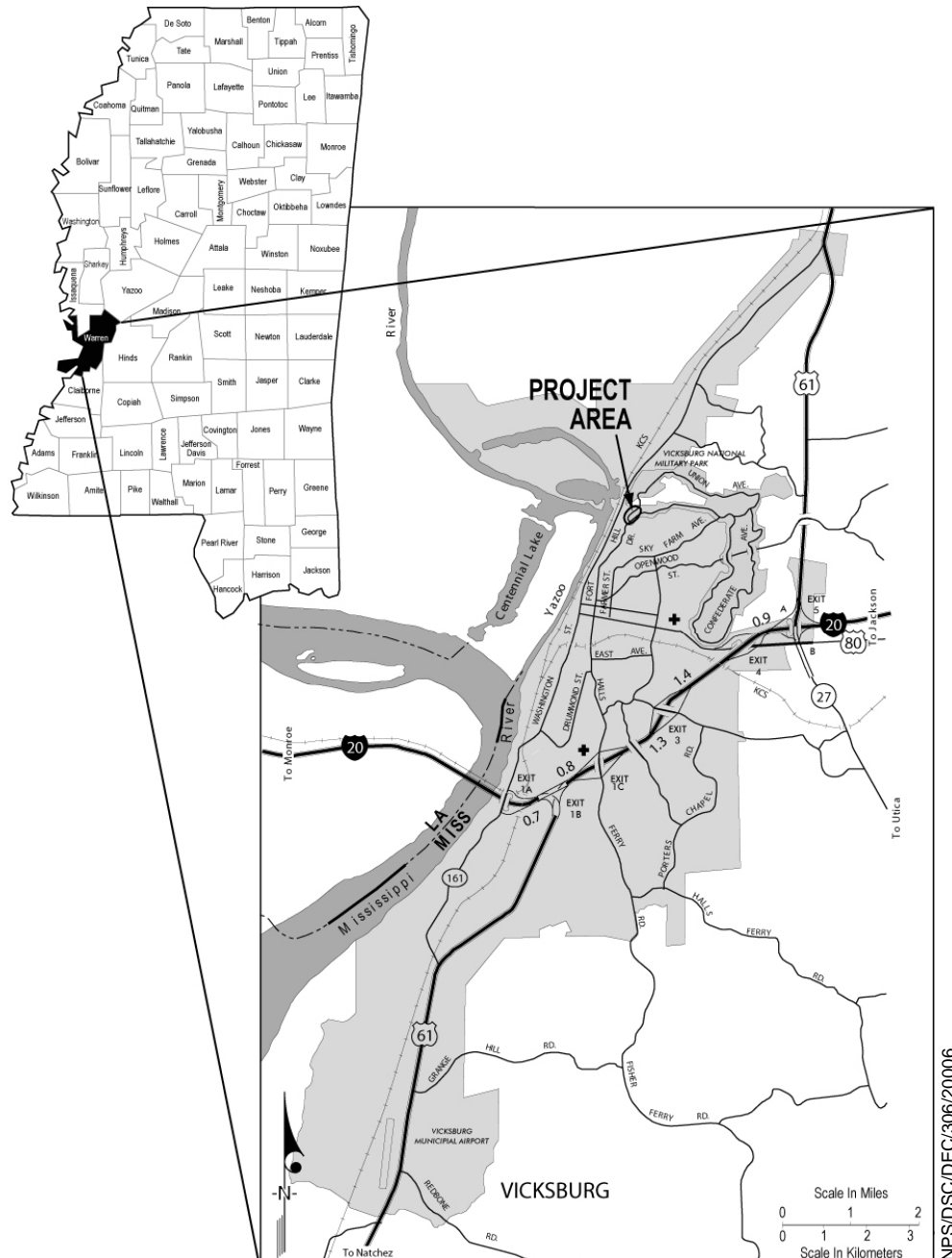


Figure 1: Project area location map.

The purpose of the proposed project is to ensure visitor and park staff safety, visitor access, and to maintain the visitor experience. In addition, the purpose of this project is to protect the historic landscape within this portion of the Vicksburg National Military Park. The project is needed because Fort Hill, located south of the Vicksburg National Cemetery and parallel to Connecting Avenue within the Vicksburg National Military Park has been eroding. The subsoils beneath the road are slumping downhill, which has been greatly exacerbated by several recent heavy rain events. As a result, Connecting Avenue, which sits at the base of Fort Hill, has buckled creating safety hazards for park staff and visitors to the park (see Figure 2). The current conditions are especially unsafe for large buses that utilize the avenue as part of their tour route (see Figure 3). In addition, if corrective measures were not taken, Fort Hill would potentially fail and collapse.



Figure 2: Road Buckling of Connecting Avenue.

This Environmental Assessment analyzes the potential environmental impacts that would result from the implementation of the proposed action. This Environmental Assessment has been prepared in accordance with the National Environmental Policy Act of 1969, the regulations of the Council on Environmental Quality for implementing the Act (40 Code of Federal Regulations 1500-1508), and the NPS Director's Order #12 (Conservation Planning, Environmental Impact Analysis, and Decision-Making) (NPS, 2001a).



Figure 3: Tour Bus on Connecting Avenue.

HISTORY AND SIGNIFICANCE OF THE PARK

Located in west-central Mississippi in Warren County, the Vicksburg National Military Park is situated in the northeastern portion of the City of Vicksburg, 44 miles west of Jackson, Mississippi. Three detached units of the park are located south of the city near the Mississippi River bridges and one unit is in Madison Parish, northeast Louisiana. The Vicksburg National Military Park preserves the American Civil War battlefield, which was the physical barrier during the campaign, siege, and defense of the City of Vicksburg in the spring and summer of 1863 (NPS, 2004b).

The Vicksburg National Military Park, established within the War Department by Congress on February 21, 1899, was the fifth national military park created by congress and is the eighth oldest national park in the United States. Park ownership was transferred from the United States Department of War on August 10, 1933 to the United States Department of Interior. The park is 1,728 acres and contains 1,324 monuments, tablets, markers, and plaques, making it one of the largest collections of battlefield monuments in the world. It preserves over 20 miles of reconstructed trenches, 15 historic bridges, 141 historic carriages and cannons, a visitor center, five historic buildings, nine historic earthen forts (such as Fort Hill), the U.S.S. Cairo gunboat and museum, 17 miles of hard-surfaced roads, and the 116-acre Vicksburg National Cemetery. The mission of the Vicksburg National Military Park is “to commemorate the campaign, siege and defense of Vicksburg and restore, protect, preserve, and interpret the unique cultural resources of Vicksburg National Military Park and Vicksburg National Cemetery” (NPS, 2004b; NPS, 2004e).

Fort Hill is one historic feature preserved within the Vicksburg National Military Park. Located in northwestern region of the park overlooking the Yazoo River Diversion Canal, Fort Hill was the anchor of the left flank of the rear Confederate defense line. Fort Hill’s high bluffs, steep slopes, and the unique properties of the loess soil were used by military strategists and commanders of the Confederate Army as defense against the Union Army (NPS, 2004b).

PROJECT BACKGROUND & PLANNING

Connecting Avenue and Fort Hill are underlain by loess soils, which have been eroding causing damage to the roadway and the hill. The loess soil that is found within the Vicksburg area and within the Vicksburg National Military Park is a fine wind blown sediment that becomes tightly compacted during water percolation. The loess soil has unique properties that allow it to be cut vertically without the need for bank stabilization. However, if the soil is left unprotected (i.e., vegetative cover is lost) and exposed to rain and moving water, the soil disintegrates causing severe erosion problems (see Figure 4). As early as the 1930s erosion had become such a problem that the Civilian Conservation Corps established four areas within the park for soil erosion projects. These projects included installing concrete drains and gutters, and planting a dense forest. The sole purpose of these projects was to control stormwater runoff and to combat erosion.

Over the past 70 years, erosion has continued to plague the park and in particular the project area. In the park's recent history, erosion has impacted the project area, causing recurring landslides. Park maintenance records show that landslides have occurred at Fort Hill and Connecting Avenue in each of the following years: 1945, late 1940s, 1962, late 1960s, and in 1980 (FHWA, 1980a). At each of these times, repairs were limited to reconstructing the roadway. In 1981, the Federal Highway Administration – Eastern Federal Lands Highway Division (FHWA-EFLHD) prepared a Soils and Foundation Report. This report summarized the results of FHWA-EFLHD subsurface investigations. The 1981 study determined that heavy surface runoff from Fort Hill, east of Connecting Avenue at the scarp (steep slope in a fortification) and in the depression southeast of the intersection of Fort Hill and Confederate Avenue, was infiltrating into the fill area and raising the water table so that failure conditions occurred. It was recommended, at that time, that a horizontal drainage system be installed to keep the water table at a safe level. It was also recommended the depression southeast of the intersection be filled and graded to assure positive drainage away from the embankment (FHWA, 1981).



Figure 4: Erosion of Loess Soils.

In 1991, the FHWA-EFLHD completed a second Soils and Foundation Report that provided the results of investigations of landslides from Thayer's Approach to Fort Hill. Based on a subsurface investigation, it was determined that a layer of sand may have been acting as a drainage layer between clay layers, causing saturation of the slope of Fort Hill (FHWA, 1991). At this time, it was recommended that a corrective design consisting of slope dewatering system using horizontal drains be completed. In addition, FHWA-EFLHD recommended an underdrain be installed below the concrete gutter to try to intercept the drainage from Fort Hill and the loess bluffs above Connecting Avenue (FHWA, 1991). The horizontal drains suggested in both 1981 and 1991 have not been installed (FHWA, 2003).



Figure 5: Erosion of Fort Hill.

In more recent years, serious rainfall has exacerbated the erosion problem in the project area (see Figure 5). In 1997, FHWA-EFLHD conducted a spot repair of Connecting Avenue. The repairs included new asphalt pavement overlay, reconstruction, and rehabilitation; new

inlet removal and replacement; new pipe culverts; and new Portland cement concrete curbing (NPS, 1997). In a field visit in March 2003, new landslides had occurred and FHWA-EFLHD, at the request of the NPS, conducted additional investigations. During these investigations, it was recommended that a subsurface drainage system be installed to try to keep the subsurface water at a level that would not cause additional erosion. This drainage system would be similar in design to those recommended in the 1981 and 1991 Geotechnical Engineer reports. In February 2004, further field visits concurred with the 1981, 1992, and 2003 recommendations.

In the summer of 2004, the NPS determined that immediate action was needed to prevent the risk that abnormally high volume rainfall events or numerous rainfall events would cause a catastrophic slope failure in which Connecting Avenue and Fort Hill would be lost due to erosion. In December 2004, Connecting Avenue had to be closed to traffic due to heavy rain events that caused the road to slump again.

SCOPING

Scoping is the effort to involve agencies, organizations, and the public in determining the issues to be addressed in an environmental document. Among other tasks, scoping determines important issues and eliminates issues determined unimportant; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related projects and associated documents; identifies other permits, surveys, and consultations required with other agencies; and creates a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made. Scoping is a process that seeks opinions and consultation from any interested agency or agency with legal jurisdiction.

Internal Scoping. The project team has met on numerous occasions in order to develop alternatives that would meet the purpose and need of this project. In addition, a multidisciplinary team meeting was conducted in August 2004 to initiate the Environmental Assessment analysis. At this meeting, the team discussed the project background, existing site conditions, and identified potential issues, feasible alternatives, and potential impacts.

External Scoping. The NPS did not initiate formal external scoping for this project. The NPS is conducting Section 106 consultation with the Mississippi State Historic Preservation Officer as part of this project. The NPS has also requested and received information from the U.S. Fish and Wildlife Service (FWS) and the Mississippi Natural Heritage Program regarding any known threatened or endangered species within the project area. Correspondence from the U.S. FWS and the state of Mississippi can be found in Appendix A.

ISSUES

Issues describe problems or concerns associated with current impacts from environmental conditions or current operations, as well as problems that may arise from the implementation of any of the alternatives. Specialists in the NPS, including the resource

management staff of the Vicksburg National Military Park, identified issues and concerns associated with the proposed action.

The primary concern/issue is slope failure. If slope failure continues along Connecting Avenue, historic Fort Hill could be destroyed. Slope movements compounded over time within the area have continued to alter the drainage of water and lowered the stability at this location (FHWA, 2004). If an abnormally high rainfall event occurs, there is the risk of failure in which Connecting Avenue and Fort Hill could be lost.

Another concern/issue for park staff is the safety of NPS employees and visitors if Fort Hill and Connecting Avenue were to fail. Currently, tour buses utilize the avenue as part of their tour route and are oftentimes unable to make the sharp turn from Connecting Avenue to Confederate Avenue without scraping the bus on portions of Connecting Avenue that have slid due to erosion and landslides. NPS employees are often working to stabilize portions of this area, which have slumped. Because of the unstable nature of the soils, there is the potential that the safety of employees and visitors could be compromised.

Additionally, the park is concerned with the impact to the cultural landscape. The landscape within the project area helped to anchor the northern flank of the Confederate lines. It is significant because the Union Army did not attempt to attack the area during the Siege of May 1863. If this section of Connecting Avenue and Fort Hill fails, the fabric of the cultural landscape would be threatened. Furthermore, if the cultural landscape is threatened this would in turn affect visitor use and experience, another concern/issue for the park. The landscape of the park is critical for visitors to understand the battle and troop placements, the deployment of attacks, and the course of the battle. If Fort Hill and Connecting Avenue were to fail, a significant part of the visitor experience would be impacted.

IMPACT TOPICS INCLUDED IN THIS DOCUMENT

Specific impact topics were developed for discussion and analysis and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and Executive Orders; 2001 *Management Policies*; and NPS knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

CULTURAL LANDSCAPES

A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity or person or exhibiting other cultural or aesthetic values. The project area is part of the cultural landscape of the Vicksburg National Military Park. This section of the cultural landscape helped to anchor the northern flank of the Confederate lines and is significant because the Union Army did not attempt to attack it during the Siege of May 1863. Impacts from taking no-action and from construction of the action alternative would have

the potential to impact the cultural landscape. Therefore, this impact is being retained for further analysis.

TOPOGRAPHY AND SOILS

As stated previously, loess soil found in the project area has unique erosion problems. Site topography conditions may be aggravated or exacerbated by the No-Action and/or action alternatives; therefore, topography and soils were retained for further analysis.

WETLANDS

Executive Order 11990 requires federal agencies to avoid, to the extent possible, the long-term and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. The proposed project has the potential to impact wetlands within and just outside the project area. Alternatives were assessed to determine potential impacts to the natural or beneficial functions of the wetland communities. Therefore, wetlands was retained for further analysis.

GROUNDWATER AND SURFACE WATER

Water resources, such as groundwater and surface water, have the potential to be impacted either by erosion and/or runoff under any of the project alternatives. Therefore, this topic was carried forward for further analysis.

VEGETATION

Vegetation in the project area is comprised of grassed areas. Continual erosion has caused a loss of vegetation overtime on Fort Hill and the area down gradient of Connecting Avenue. There are also two imperiled plant species located within a two-mile radius of the project area. Past and future actions have the potential to impact vegetation and land cover within the project area. Therefore, this impact topic was retained for further analysis to determine the effect of the project on vegetation.

SAFETY

The safety of NPS employees and visitors to the park could be affected by the project alternatives. Because of the heavy use of the road and the erosive nature of the loess soils, there is the potential that the safety of employees and visitors could be compromised. Therefore, safety was retained for further analysis.

VISITOR USE AND EXPERIENCE

The project alternatives have the potential to cause short-term and long-term impacts on visitor use and experience because the landscape of the park is critical for visitors to understand the battle and troop dispositions, the deployment of attacks, and the course of the Siege of 1863. If Fort Hill and Connecting Avenue were to fail, a significant part

of the visitor experience would be impacted. As a result, visitor use and experience was retained for further analysis.

PARK OPERATIONS

Park Operations is included as an impact topic because park staff is currently called upon to “fix” unstable road and landscape conditions within the project area. In the past when the road and soils have slumped the park has closed temporarily Connecting Avenue, thus impacting park operations. The no-action and the proposed action may impact park operations, thus this impact topic was retained for further analysis.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The topics listed below would either not be affected or would be affected negligibly by the alternatives evaluated in this document. Therefore, these topics have been briefly discussed in this section of the Environmental Assessment and then dismissed from further consideration or evaluation.

GEOLOGY

The Vicksburg National Military Park is part of the loess hills physiographic province, which is an area characterized by steep hills and bluffs rising abruptly from the adjacent Mississippi River alluvial plain. These hills and bluffs range from 75 to 125 feet in height and are 10 to 25 miles in width. This region contains the thickest deposits of loess soil in the Tennessee-Mississippi-Louisiana area (USDA, 1964; Walker, 2004). The project area is located in a seismic area of 4 percent g (acceleration due to gravity). Areas over 3 percent have some risk of seismic activity. Geology would not be impacted by this project; therefore, this impact topic was dismissed from further analysis.

FLOODPLAINS

According to the Flood Insurance Rate Map for the City of Vicksburg, the project area is within a non-zoned area (See Figure 6). Although the project area has not been mapped because it is federally owned, the adjacent land is Zone C and X. Both of these zones are not located within the 100-year floodplain and are the flood insurance rate zones that correspond to areas outside the 1-percent annual chance floodplain. Zone X is an area determined to be outside the 500-year floodplain (FEMA, 1989).

The repair and stabilization of Connecting Avenue would have no impact to floodplains. Therefore, Floodplains was dismissed as an impact topic.

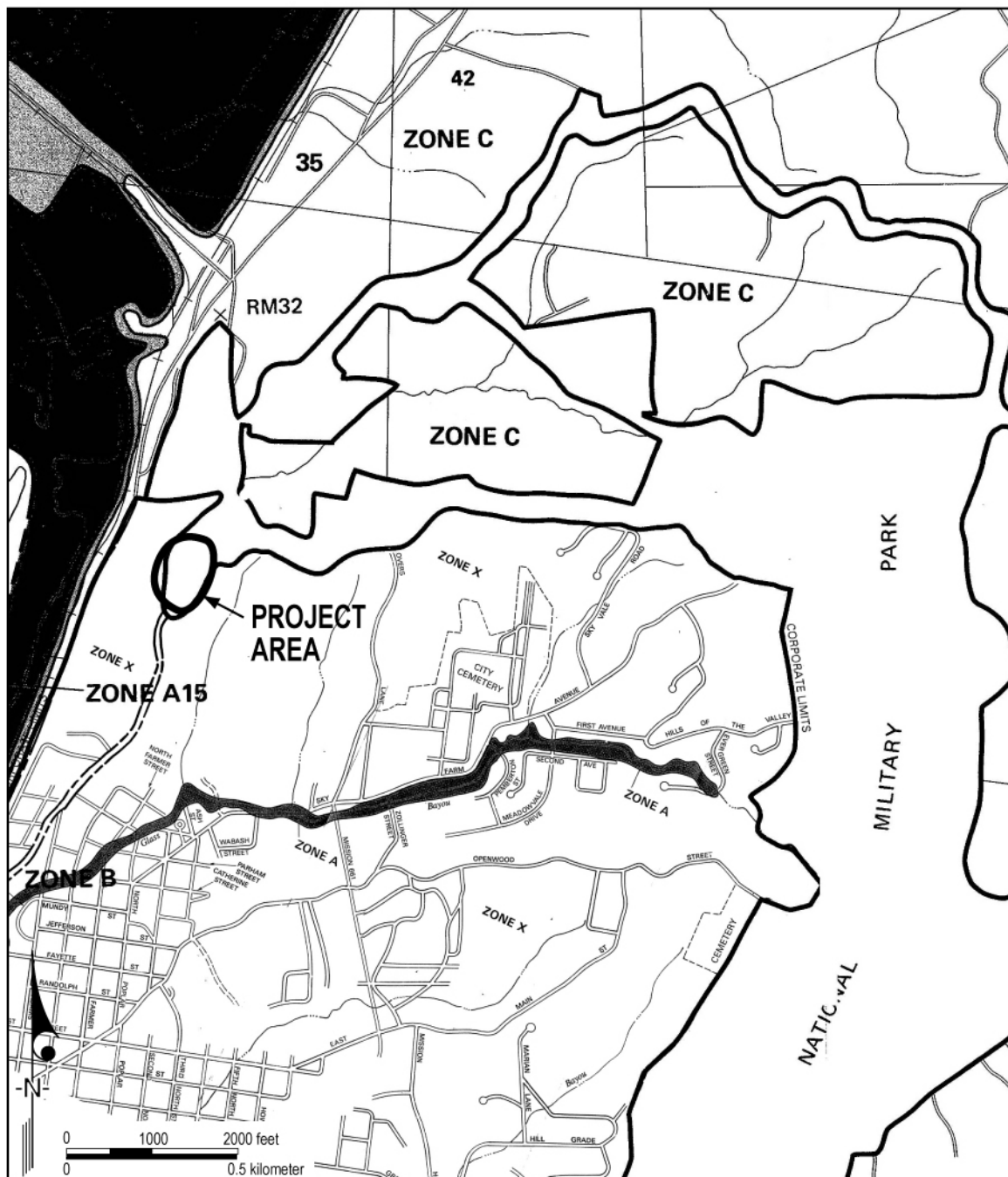


Figure 6: Floodplain Map

AIR QUALITY

Air quality became a national concern in the mid-1960s, leading to the passage of the Air Quality Act in 1967. The Act, which is now referred to as the Clean Air Act, and subsequent amendments have established procedures for improving conditions, including a set of National Ambient Air Quality Standards (NAAQS).

In 1997 the EPA established the 8-hour ground level ozone standard at 0.08 parts per million (ppm). Under this standard, the EPA can designate an area as nonattainment if it has violated the 8-hour ozone standard. The EPA may also designate an area as attainment/unclassifiable, which are areas where monitored air quality data show either that the area has not violated the ozone standard over a three-year period or if there is not enough information to determine the air quality in the area. The entire state of Mississippi is designated as an attainment or unclassifiable area (USEPA, 2004).

The proposed project would have short-term, adverse impacts to air quality due to vehicle and construction equipment emissions and fugitive dust during construction. These impacts would be negligible because the impacts would be barely perceptible to visitors. Once construction is complete, this project would increase visitor safety and access to the park; however, this improvement would not be expected to change traffic volumes. Therefore, the repair and stabilization of Connecting Avenue would not change air quality in the park. For this reason, Air Quality was dismissed as an impact topic.

WILDLIFE & THREATENED AND ENDANGERED SPECIES

The 1,728 acres of parkland at the Vicksburg National Military Park make it an excellent habitat for many species of birds and mammals. Trees planted during the 1930's in the park are today home to many mammal species (NPS, 2004d; USGS, 2004). Common mammal species within the project area are the white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), beaver (*Castor canadensis*), eastern cottontail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), and gray squirrel (*Sciurus carolinensis*).

Numerous avian species are permanent residents seen year round in the park. Species include the great blue heron (*Ardea herodias*), wood duck (*Aix sponsa*), red-tailed hawk (*Buteo jamaicensis*), and one federally threatened species, the bald eagle (*Haliaeetus leucocephalus*). The Yazoo River and bayous provide an abundant source of prey for the bald eagle. The bald eagle has been observed in Vicksburg's river and bluff habitats, specifically in the vicinity of Fort Hill (NPS, 2004a). In addition, the size and duration of the project are not likely to negatively impact any potential foraging or roosting habitat that bald eagles might utilize.

The U.S. Fish and Wildlife Service and the Mississippi Natural Heritage Program were contacted to determine whether any known critical habitats or listed rare, threatened, or endangered species or species of concern have been documented on or adjacent to the project area. The U.S. Fish and Wildlife Service indicated that there are no records of any federally listed rare, threatened, or endangered species or species of concern within the project area (USFWS, 2004a).

According to the records of the Mississippi Natural Heritage Program, the southern redbelly dace (*Phoxinus erythrogaster*) is a state imperiled fish species found within a two-mile radius of the project area (MNHP, 2004). The park staff indicated that the southern redbelly dace is not listed on the park's inventory. Based upon the consultations with park staff, "construction activities would have no impact on this species or on other wildlife within the project area."

The consultation letters from the U.S. Fish and Wildlife Service and the Mississippi Natural Heritage Program are provided in Appendix A.

Because there would be no impact to wildlife or threatened and endangered species within the project area, Wildlife and Threatened & Endangered Species was dismissed as an impact topic.

SOUNDSCAPE MANAGEMENT

In accordance with the NPS Management Policies (NPS, 2000a) and Director's Order #47, *Sound Preservation and Noise Management* (NPS, 2000b), an important objective of the NPS' mission is the preservation of natural soundscapes associated with NPS units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and these sounds can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and duration of human-caused sound considered acceptable varies among NPS units. Acceptance levels of noise for each park unit are generally greater in developed areas and less in undeveloped areas.

The repair and stabilization of Connecting Avenue would not increase noise levels. Construction activities would have short-term, adverse impacts on noise levels. The impact would be negligible because noise generated from construction is not anticipated to disrupt visitor activities. The contractor would be required to comply with local noise ordinances. Because the proposed action would not result in an increase in noise levels in or near the project area and only negligible, short-term, adverse impacts on noise levels during construction would occur, Soundscape Management was dismissed as an impact topic.

LIGHTSCAPE MANAGEMENT

In accordance with NPS Management Policies (2000a), the NPS strives to preserve to the extent possible the quality of lighting associated with natural ambient landscapes and the night sky. The repair and stabilization of Connecting Avenue at the Vicksburg National Military Park would not introduce new artificial lighting. Because the proposed action would not impact or contribute to the natural ambient lightscapes, Lightscape Management was dismissed as an impact topic.

HISTORIC STRUCTURES/SITES

"Historic properties," as defined by the implementing regulations of the National Historic Preservation Act (36 CFR 800), are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and the remains that are related to and located within such properties, as well as traditional and culturally significant Native American sites and historic landscapes. The term "eligible for inclusion in the Na-

tional Register” includes both properties formally determined eligible and all other properties that meet National Register listing criteria.

The significance of historic properties is generally judged against a property's ability to meet at a minimum one of the four criteria for inclusion on the National Register of Historic Places (36 CFR 60):

- Association with events that have made a significant contribution to the broad patterns of our history; or
- Association with the lives of persons significant in our past; or
- That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- That has yielded, or may be likely to yield, information important in prehistory or history.

Properties may be eligible for the National Register for contributions at the national, state, or local level. Ordinarily, properties achieving significance within the last 50 years are not considered eligible unless they are integral parts of historic districts or unless they are of exceptional importance. The most common types of properties less than 50 years old listed on the National Register are works of modern architecture or scientific facilities. Additionally, in order for a structure or building to be listed in the National Register, it must possess historic integrity of those features necessary to convey its significance (i.e., location, design, setting, workmanship, materials, feeling, and association see National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation* (NPS, 1990).

Vicksburg National Military Park has an extensive collection of historic structures and objects including 661 monuments, 594 cast iron tablets and position markers, 70 bronze castings, 18,000 headstones located within the Vicksburg National Cemetery, 141 cannons, 15 bridges, 6 buildings, and the ironclad gunboat U.S.S. Cairo (NPS, 2004d).

The historically significant buildings, structures, and objects at Vicksburg National Military Park are spread within and outside the park. There are, however, no monuments, buildings, or sites in the vicinity of the project area except for Fort Hill. The nearest monument is the Tennessee State Monument, which is located about one-half mile east along Confederate Avenue. The Vicksburg National Cemetery is located slightly less than half a mile to the north at the terminus of Connecting Avenue. Objects associated with Fort Hill include cannons and plaques.

The proposed action is not expected to have any significant physical, audible, or visible effects that would have the potential to impact monuments and objects either within or near the project area. Fort Hill is a historic resource; however, it is also a part of the cul-

tural landscape. Impacts to Fort Hill from the No-Action and action alternatives in this Environmental Assessment are described under Cultural Landscapes. Because no other historic sites or structures will be impacted by the proposed project, impacts to historic structures were dismissed from further consideration.

ARCHEOLOGICAL RESOURCES

The Vicksburg National Military Park is listed in its entirety on the National Register of Historic Places. All archeological sites located within the area are protected under this listing (VICK, 1979). However, a formal comprehensive archeological survey, conducted to determine if a site independently qualifies for the National Register of Historic Places, has not been undertaken because any testing, excavations, or investigations would be destructive to values that might exist (NPS, 1979).

A Phase I archeological survey was conducted for the Railroad Redoubt Vista Clearing project in August of 2004. During this survey, 275 artifacts were found and their positions recorded using a Global Positioning System unit. The artifacts found appeared to confirm what has been previously documented about what occurred in this area of the park (NPS, 2004a).

No archeological survey has been conducted within the project area; however, the project area was once home to the Garbish Subdivision prior to NPS ownerships. Once the land was acquired by the NPS in 1939, the structures in the subdivision were removed and the area was bulldozed and graded to eliminate the rugged topography. Due to the extensive bulldozing and grading that was conducted in the late 1930s and early 1940s, this area is disturbed and poses little, if any potential for significant archeological artifacts. Because the area is severally disturbed no archeological testing would be required. An approved archeologist that meets the Secretary of the Interiors standards would monitor the site during construction. In the unlikely event that intact cultural resources are encountered, construction in that area would be halted until the archeologist can assess the situation. In addition, in the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3002) of 1990 would be followed. All human remains, funerary objects, sacred objects, or objects of cultural patrimony would be left in place until the culturally affiliated tribe(s) was consulted and an appropriate mitigation or recovery strategy developed.

Because there is little to no potential for significant archeological artifacts to be present within the project area, no impact to archeological resources is anticipated. Therefore, this impact topic was dismissed from further analysis.

MUSEUM COLLECTIONS

Currently, the museum collection of the Vicksburg National Military Park comprise over 297,465 items. These items are on display at the U.S.S. Cairo Museum and at the park's visitor center. The entire collection is comprised of two distinct collections. The

first includes items directly from the battlefield, such as original letters, diaries, books, clothing, and the accouterments donated by soldiers, civilians, and their descendants. The second contains of items recovered during the salvage of the U.S.S. Cairo gunboat, a powerful Union ironclad which served in the lower Mississippi River basin. The proposed project would not impact the current museum collection. Any artifacts recovered during construction would be preserved according to NPS standards as described in Director's Order #24, *Museum Collections Management*. Because the museum collection of the Vicksburg National Military Park would not be affected by the proposed action, this impact topic was dismissed.

ETHNOGRAPHIC RESOURCES

The NPS defines ethnographic resources as any "site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence or other significance in the cultural system of a group traditionally associated with it" (Director's Order #28, *Cultural Resources Management Guidelines*, p. 181). Because there are no known ethnographic resources within or in close proximity to the project area, this impact topic was dismissed.

INDIAN TRUST RESOURCES

The Department of the Interior Secretarial Order 3175 (Departmental Responsibilities for Indian Trust Resources) requires that any anticipated impacts to Indian Trust Resources from a proposed action by Department of the Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. It represents a duty to carry out the mandates of federal law with respect to Native American and Alaskan native tribes.

Based upon the professional judgment of park staff, there are no Indian Trust Resources within the project area. The lands are not held in trust by the Secretary of the Interior for the benefit of Native American and Alaskan native tribes. Therefore, this impact topic was dismissed from further analysis.

SOCIOECONOMICS

The Vicksburg National Military Park is located in Warren County, Mississippi, in the northeastern portion of the city of Vicksburg. Education, health, social services, manufacturing, the arts, entertainment, recreation, accommodation, and food services are the primary industries in the county (U.S. Census, 2000). The Vicksburg National Military Park is also an economic contributor, as it received approximately 914,501 visitors in 2003 (NPS, 2004b).

There would be no change in employment at the Vicksburg National Military Park as a result of the proposed project. Minimal employment opportunities and some related revenues for construction materials are anticipated for this project. The proposed project would contribute to a beneficial impact of the economy as a result of improved park access, tourism, and safety. However, these socioeconomic impacts would be negligi-

ble and with a long-term, beneficial impact to the local economy of the surrounding area. Therefore, Socioeconomics was dismissed as an impact topic.

LAND USE

Of the approximately 1,728 acres of the Vicksburg National Military Park, the project area is approximately 11.25 acres. The project area is composed primarily of undeveloped land within the corporate limits of Vicksburg, Mississippi (NPS, 2004b). Residences located south of the project area, in the city of Vicksburg, would not be impacted by the proposed action. Because the project area is on National Park Service property and thus, is federally owned, there is no local zoning designation for this area. The road repair and stabilization would be consistent with surrounding zoning and existing land use. The existing land use would not change as a result of the proposed road improvements; therefore, Land Use was dismissed as an impact topic.

ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, directs federal agencies to identify and address as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies and activities on minority or low-income populations.

According to the 2000 U.S. Census Bureau, the minority community in Warren County, Mississippi is approximately 45 percent and approximately 11.7 percent of the population is over the age of 65. The percentage of all individuals living below the poverty line in Warren County is approximately 18.7 percent, which is slightly higher than the national average of 13 percent.

Neither of the alternatives under consideration would have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Draft Environmental Justice Guideline (July 1996). Therefore, Environmental Justice was dismissed as an impact topic.

PARKS & RECREATION

The Vicksburg National Military Park preserves over 20 miles of reconstructed trenches, 15 historic bridges, 141 historic carriages and cannons, a visitor center, 5 historic buildings, 9 historic earthen forts, the U.S.S. Cairo gunboat and museum, 17 miles of hard-surfaced roads, and the 116-acre Vicksburg National Cemetery. The park received 914,501 visitors in 2003 (NPS, 2004b; NPS, 2004e). In addition, the Chickasaw Bayou Battlefield is located north of the project area. The Historic Southern Railroad of Mississippi, located south of the project area, runs through the southern portion of the park. East of the project area is the Big Black River Bridge, Champion Hill, and the Raymond and Jackson Battlefields. South of the city of Vicksburg are the Grand Gulf, Port Gibson Battlefields, and Port Hudson Battlefield. Another recreation attraction is the 105-acre Natchez National Historical Park, located approximately 70 miles south of the project area. This historical park had 281,277 recreation visits in 2003 (NPS, 2004d).

It is anticipated that park visitors would take advantage of the local and regional parks and recreational activities available in the vicinity of the project area. However, the proposed project would not impact these additional parks and recreational areas or the quantity or quality of existing features within the Vicksburg National Military Park; therefore, this impact topic was dismissed.

COMMUNITY FACILITIES & SERVICES

The proposed action would have no effect on the existing or future site use or conditions. The repair and stabilization of Connecting Avenue would have no effect on community facilities or existing levels of services for emergency response, fire and rescue, police, and schools. Therefore, Community Facilities & Services was dismissed as an impact topic.

INFRASTRUCTURE

Existing utilities would be identified prior to earth disturbance activities. According to park staff, there are no utilities along Connecting Avenue within the project area. Utilities extend south from Route 61 to provide water and sewer services to the Visitor Centers at the U.S.S. Cairo and the Vicksburg National Cemetery, approximately 0.5 miles north of the project area. Trash is collected by park staff and put into a dumpster, which is then collected by a contractor. There is also natural gas service in the area surrounding project area but none within the project area.

The existing water and sewer infrastructure would not be impacted by the repair and stabilization of Connecting Avenue because the proposed action would not increase water and sewer service. The proposed action would also not affect service levels provided by the power or gas companies because service levels would not increase. Waste management would not be impacted in the project area because waste is not anticipated to increase. The proposed action would have no impact on existing infrastructure. Therefore, Infrastructure was dismissed as an impact topic.

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ALTERNATIVES

ALTERNATIVE A – NO-ACTION ALTERNATIVE

The No-Action Alternative describes the action of continuing the present management operations and conditions. It does not imply or direct discontinuing the present action or removing existing uses, development, or facilities. The No-Action Alternative provides a basis for comparing the management direction and environmental consequences of the action alternatives. Should the No-Action Alternative be selected, the National Park Service would respond to future needs and conditions associated with the Vicksburg National Military Park without major actions or changes in present course.

Under the No-Action Alternative, the National Park Service would conduct minor spot repairs of Connecting Avenue. However, Fort Hill would continue to slump due to the percolation of water down through the hill and out from its base. Connecting Avenue, which sits at the base of the hill, would remain buckled from the erosion of loess soils on Fort Hill; ultimately causing it to fail. A safety risk would continue to impact park staff and visitors due to the continuing slumping of Fort Hill and the failing of Connecting Avenue. Currently, visitor use and experience has been affected by the closing of Connecting Avenue due to continued slumping of Fort Hill during the month of December 2004. Visitor use and experience would continued to be impacted if there are no substantial changes to Fort Hill.

ALTERNATIVE B – REPAIR TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Under Alternative B, the National Park Service would construct a “shear key buttress,” 300 feet below and roughly parallel to Connecting Avenue. The buttress would be approximately 380 feet long, 30 feet deep (exposing the limestone bedrock), and 45 feet wide at the top and 10 feet wide at its base. Around the buttress, a layer of geotextile fabric would be used at the rock/soil interface. The buttress would be filled with rip rap material. The shear key buttress would terminate below grade, allowing final grading above the buttress to blend with the existing topography. After construction, the slope would be recontoured and revegetated with native species or “historical” native species such as Bermuda grass.

Alternative B would also include the construction of an two underdrain systems that would extend along the length of the shear key buttress on the upslope side of the buttress. This drain would outlet at both ends of the buttress and extend out approximately 190 to 230 feet to surface level down slope of the buttress.

Connecting Avenue would be excavated. The existing asphalt and aggregate base would be removed and replaced in kind. A curb and gutter system with integral drainage piping would be constructed concurrently with the new roadway.

Disturbance to the physical landscape resulting from this project would be limited to the development footprint, which includes areas for construction equipment and laydown areas, except where based drains discharge down slope. Figure 7 depicts the design of Alternative B.

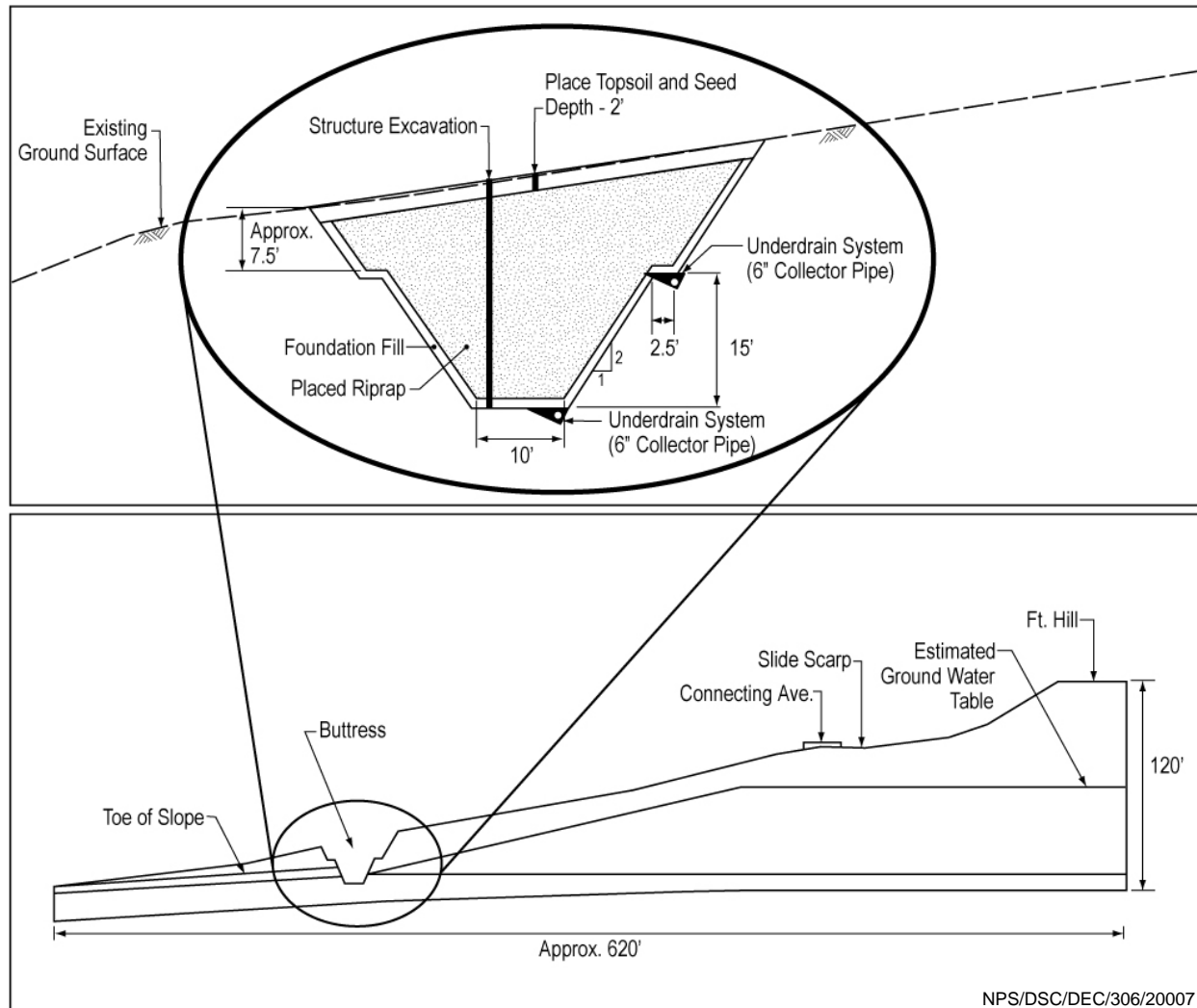


Figure 7: Side profile of the area of disturbance.

STAGING AREA

The staging area for this project would be located directly north of the project area in an open field near the tree line that separates the Vicksburg National Cemetery from the project area. Construction vehicles would utilize Givins Road off of Business Route 61 (Washington Street) to access the staging area. Construction vehicles would leave Givins Road and drive through the parking lot for the U.S.S. Cairo visitor's center to reach the project area. The U.S.S. Cairo and the Vicksburg National Cemetery would

remain open during construction. This area is convenient to the project area, and construction vehicles would not have to travel throughout the park to reach the project area.

MITIGATION MEASURES OF THE ACTION ALTERNATIVE

The NPS places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources and the quality of the visitor experience, the following protective measures would be implemented as part of the action alternative. The NPS would implement an appropriate level of monitoring throughout the construction process to help ensure that protective measures are being properly implemented and to achieve their intended results.

- An approved NPS archeologist would monitor the site during construction. In the event that potentially significant deposits or features are discovered during this process, work would be halted until finds could be documented, their significance assessed, and if appropriate mitigation strategies developed in consultation with the Mississippi State Historic Preservation Officer. If necessary, a Memorandum of Agreement would be developed.
- In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during the survey or during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3002) of 1990 would be followed. All human remains, funerary objects, sacred objects, or objects of cultural patrimony would be left in place until the culturally affiliated tribe(s) was consulted and an appropriate mitigation or recovery strategy developed.
- A construction sequence plan would be implemented to control soil instability and avoid collapse of the cut sections and slope during construction. The construction sequence would consist of closed-sequenced excavation conducted in phases that consist of cutting a limited distance (approximately 30 feet) at one time. Excavations would be filled by the end of the day and no cut would be left open over night.
- An appropriate Sediment and Erosion Control Plan would also be implemented by FHWA through consultation with NPS and addressed in the construction contract.
- FHWA would need to obtain the appropriate storm water permit, which would include completion of a Small Construction Notice of Intent and a Storm Water Pollution Prevention Plan prior to the start of construction.
- The U.S. Army Corps of Engineers might require a permit for the placement of temporary piping in Intermittent Stream A prior to construction.

- Sustainable best management practices would be utilized to control stormwater runoff.
- NPDES permits would be obtained by FHWA.
- Construction would occur in a drier period of the year to reduce the amount of runoff from exposed soils.
- Wetlands adjacent to the project area would be protected during construction using appropriate sediment and erosion control measures.
- Fire truck access to the park structures would be made available and would be identified to the Vicksburg Fire Department (if alternate routes are required).

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order #12 (NPS, 2001a), the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including Environmental Assessments. As described in the Council on Environmental Quality regulations, the environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act, which considers the following:

1. Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assuring for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. Preserving important historic, cultural, and natural aspects of our National heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities; and
6. Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (National Environmental Policy Act, Section 101).

The No-Action Alternative (Alternative A) represents the current management practices at the Vicksburg National Military Park. The No-Action Alternative does not provide as much resource protection as the preferred alternative, and resource impacts would be expected to increase over time. Under this alternative, impacts to the soils, geology, and topography and water resources would continue. If these impacts are allowed to

continue, Fort Hill could be destroyed. Furthermore, if Fort Hill were impacted then the cultural landscape would be affected from the loss of an important contributing feature. Visitor experience and safety impacts would also increase under this alternative. Thus, the no-action alternative does not meet any of the national environmental policy goals.

Under Alternative B, stabilizing and repairing Connecting Avenue would help prevent the ultimate failure of Fort Hill, an important cultural resource, and it would help preserve visitor use and experience. This alternative would also reduce impacts to soils, geology, and topography. Furthermore, this alternative would also assure a safer environment for visitors and park staff.

After reviewing the potential resources and other impact topics, and developing appropriate mitigation measures, Alternative B best ensures and addresses the provision of the national environmental policy goals stated in NEPA Section 101. It satisfies these environmental criteria more sufficiently than the No-Action Alternative for the following reasons:

- Prevents loss of cultural and natural resources (Criteria 1 and 4) by maintaining the fabric of the cultural landscape and preventing further erosion of Fort Hill and slumping of Connecting Avenue, thereby fulfilling the park's responsibilities as trustee of the environment and alleviating impacts on these resources.
- Assures a safe and aesthetically pleasing environment for future generations to be able to enjoy and understand the significance of this major battle within the Civil War (Criteria 2 and 5) without risk of imperil; hence, ensuring its preservation for future generations.
- Attains the widest range of beneficial uses of the environment through protection of key natural and cultural resources (Criteria 3).
- Offers a long-term sustainable solution by appropriately repairing and stabilizing Connecting Avenue and Fort Hill (Criteria 6).

The preferred alternative (Alternative B) provides for the greatest range of beneficial impacts to natural and cultural resources. Therefore, the NPS' preferred alternative, Alternative B (Repair Tour Road on Connecting Avenue), is the environmentally preferred alternative.

CONSTRUCTION COST AND SCHEDULE

The net cost of this project is estimated to be \$940 thousand. The NPS plans to perform the construction in Fiscal Year 2005.

ALTERNATIVES CONSIDERED BUT DISMISSED

The No-Action and one action alternative were retained for further analysis in this Environmental Assessment; however, the NPS considered additional alternatives during the

planning stages and project scope development for this project. Alternatives considered, but dismissed, and the reasoning for their dismissal, are provided below.

The first alternative considered horizontal drains. There are three concerns associated with this alternative, which made this consideration not viable: 1) construction would almost be impossible because of drains lengths from 200 to 400 feet, 2) the slot opening of the pipe would be larger than the small loess soil material, thus raising pumping concerns and surface tension issues, and 3) horizontal drains are typically not effective for long-term use.

The second alternative consisted of using a lightweight fill. It was decided that this method would eventually fail and would create stability concerns.

The third alternative considered by NPS entailed using stone columns and/or geosock. This alternative did not have a high enough factor of safety to be further considered. It was also thought that with stone columns, soil material upslope would be lost. The project team also considered the addition of a berm, additional wall options, and combinations of these alternatives. However, the proper factor of safety could not be obtained under any of these alternatives.

IMPACT COMPARISON MATRIX

Table 1 compares and contrasts each of the alternatives, including the degree to which each alternative accomplishes the purpose or fulfills the need identified in the purpose and need section. Table 2 presents impacts of the project alternatives, including the No-Action Alternative, for comparison purposes, a concise summary of each alternative's potential effects by impact topic.

TABLE 1: COMPARATIVE SUMMARY OF THE NO-ACTION AND ACTION ALTERNATIVES

Alternative A (No-Action Alternative)	Alternative B Repair Tour Road on Connecting Avenue (Preferred Alternative)
<p>Under the No-Action Alternative, the repair and stabilization of Connecting Avenue would not be conducted. The tour road would continue to slump due to the erosive nature of the soil and the water percolation through Fort Hill to its base. This road would not be able to provide adequate safety to tourists visiting the Vicksburg National Military Park.</p> <p>Meets Project Objectives? No, because the No-Action Alternative does not meet the purpose and need for the project. It would not improve preservation, access, or safety of the tour road.</p>	<p>Alternative B would correct the slumping of Fort Hill by installing a toe buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress with an outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind and a curb and gutter system would be installed.</p> <p>Meets Project Objectives? Yes, because Alternative B meets the purpose and need for the project. Alternative B would ensure visitor and park staff safety, visitor access, and improve the visitor experience. Alternative B further meets the purpose and need by preserving the historic landscape by helping prevent slumping of Fort Hill.</p>

**TABLE 2: COMPARATIVE SUMMARY OF POTENTIAL
ENVIRONMENTAL IMPACTS**

Impact Topic	Alternative A No-Action Alternative	Alternative B Repair Tour Road on Connecting Avenue (Preferred Alternative)
Cultural Landscapes	The No-Action Alternative would affect the cultural landscape of the Fort Hill area creating a moderate long-term adverse impact. The No-Action Alternative would add a perceptible adverse component to moderate long-term adverse and beneficial cumulative effects.	Alternative B would create a minor short term adverse impact to the cultural landscape during construction. With revegetation of the project area after construction, Alternative B would have a moderate long-term beneficial impact to the cultural landscape. Alternative B would add a perceptible beneficial component to minor adverse and moderate beneficial long-term cumulative effects.
Topography & Soils	Under the No-Action Alternative, minor to moderate long-term adverse impacts to topography and soils would continue because of the soil erosion and slumping of the topography occurring within the project area. The No-Action Alternative would add a perceptible adverse component to moderate long-term adverse and beneficial cumulative effects.	Impacts to topography or soils within the project area would result in minor to moderate long-term adverse impacts and moderate long-term beneficial impacts under Alternative B. Alternative B would add a perceptible adverse and beneficial component to the moderate long-term adverse and beneficial cumulative effects.
Wetlands	Minor long-term adverse impacts would occur under the No-Action Alternative. The No-Action Alternative would add a perceptible adverse component to the overall cumulative effects	Alternative B would have minor long-term beneficial impacts to depressional area and riverine intermittent stream systems. Water flow into the wetlands would be controlled with appropriate stormwater management controls, which would prevent further erosion and reduce impairment to the water quality of the intermittent streams. Alternative B would add a perceptible minor long-term beneficial component to the overall cumulative effects.
Groundwater & Surface Water	Without the stabilization of Connecting Avenue, erosion would continue to have minor long-term adverse impacts to water quality. The No-Action Alternative would add a perceptible adverse component to the overall cumulative effects.	Alternative B would have minor long-term beneficial impacts to surface water. Water flow into the streams would be controlled with appropriate stormwater management controls, which would prevent further erosion and reduce impairment to the water quality of the groundwater and surface water. Minor long-term impacts to groundwater would occur, which would be beneficial and adverse. The construction of the drainage pipes and buttress would potentially provide slope stability and reduce slope failures but would also potentially lower groundwater levels causing the soil above the buttress to weaken and settle. Alternative B would add a perceptible minor long-term beneficial and adverse component to the overall cumulative effects.

Impact Topic	Alternative A No-Action Alternative	Alternative B Repair Tour Road on Connecting Avenue (Preferred Alternative)
Vegetation	Under the No-Action Alternative, vegetation would continue to be impacted by erosion occurring within the project area. These impacts would be minor long-term and adverse. The No-Action Alternative would add a perceptible adverse component to the moderate long-term beneficial cumulative effects.	Under Alternative B, there would be minor short-term adverse impacts to vegetation from the removal of vegetation during construction. Alternative B would prevent further soil erosion; therefore, a moderate long-term beneficial impact would occur. Alternative B would add a perceptible beneficial component to the moderate long-term beneficial cumulative effects.
Safety	Moderate long-term adverse impacts to visitor and park staff safety would occur. Connecting Avenue would continue to buckle due to erosion and slumping of loess soils on Fort Hill. The No-Action Alternative would add a perceptible adverse component to minor long-term beneficial and adverse cumulative effects.	With Alternative B, park staff and visitors would experience moderate long-term beneficial impacts to their safety because the problem associated with erosion and slumping of Fort Hill, which is causing Connecting Avenue to buckle, would be addressed. Alternative B would contribute a measurable beneficial increment to the minor long-term beneficial and adverse cumulative effects.
Visitor Use & Experience	The continuation of the No-Action Alternative would have a moderate, long-term, adverse impact on visitor use and experience. The No-Action Alternative would add a perceptible adverse impact to the minor to moderate long-term beneficial cumulative impact.	A moderate long-term beneficial impact would result from the implementation of Alternative B. Minor short-term adverse impacts would occur during construction. Alternative B would add a perceptible beneficial impact to the minor to moderate long-term beneficial cumulative impact.
Park Operations	The No-Action Alternative would have a minor to moderate adverse impact to park operations due to repairs that would be conducted in the project area to combat erosion and slumping. Safety of the employees would also be impacted. The adverse impact of the No-Action Alternative, would add a perceptible adverse component to the minor to moderate beneficial cumulative effects.	Providing a sustainable solution to prevent further erosion of Fort Hill and repairing and stabilizing Connecting Avenue would create moderate long-term beneficial impacts to park operations. Alternative B, in conjunction with these actions, would contribute a measurable beneficial increment to the minor beneficial cumulative effect.

AFFECTED ENVIRONMENT

The Vicksburg National Military Park is situated in the northeastern portion of the city of Vicksburg, 44 miles west of Jackson, Mississippi. The project area is bounded by the Vicksburg National Cemetery and U.S.S. Cairo Museum to the north, vegetation on steep slopes to the south and west, and Fort Hill and Confederate Avenue to the east. The project area is located in the northwestern region of the park. The project area comprises approximately 11 acres of the 1,728 acres that constitute the Vicksburg National Military Park (NPS, 2004b).

The following provides further description of the specific resources identified as impact topics associated with the proposed project. These impact topics were determined, as topics that may potentially have a greater than negligible or minor adverse or beneficial impact, during internal National Park Service project scoping and in consultation with Greenhorne & O'Mara, Inc. and the Federal Highway Administration – Eastern Federal Lands Highway Division (FHWA-EFLHD).

CULTURAL LANDSCAPES

A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic value. There are four general kinds of cultural landscapes: Historic Sites, Historic Designed Landscapes, Historic Vernacular Landscapes and Ethnographic Landscape (NPS, 1998).

Although no formal analysis of the cultural landscape at the Vicksburg National Military Park has been made, the landscape was an essential element of the historic battlefield. During the Civil War, military strategists and commanders of Confederate and Union forces used the high bluffs, steep rugged ravines, and unique properties of the loess soil to their advantage.

The park's landscape features are essential to the interpretation of the battle, and show the wide variety of military operations during the historic battle. The landscape features nine historic earthen forts; numerous gun emplacements; over twenty miles of reconstructed trenches, approaches, and parallels; the last remaining section of Grant's Canal; a tour road system; an extensive collection of commemorative monumentation; and the Vicksburg National Cemetery. Much of the park consists of open viewsheds, as the park contains over 800 acres of grass.

During the Siege of 1863, the area now encompassed by the park was mostly devoid of woody vegetation due to the actions of the Confederate and Union armies (NPS, 2004). During the siege, both armies cleared trees to provide materials for defense fortifications or to clear the line of fire between combatants. Today, that view is blocked by a dense forest. Due to severe soil erosion between the battle and the 1930s, the Civilian Conservation Corp planted trees on the steep slopes and in the ravines. Today, great efforts are expended by the park to restore and maintain the historic landscape, includ-

ing vista clearing projects and vegetation control. With the trees and vegetation cleared away from historic earthworks, visitors are afforded a more accurate view of the historic defense and thus, attain a greater understanding of the difficult obstacles that the Union army faced while trying to approach over steep and hilly terrain. Additional efforts include preventing damage from natural forces such as erosion, eradicating exotic species, and limiting human threats including vandalism, looting, and urban encroachment.

The cultural landscape is likely eligible for the National Register under Criterion A for its association with key events in the Civil War; under Criterion B for its association with historically significant persons including Grant, Sherman, and Pemberton; under Criterion C for both its natural and designed elements that played an essential role in the campaign and its subsequent commemoration; and also under Criterion D for its unknown archeological resources that may yield or are likely to yield information important to the history.

Fort Hill is located in the northwest section of the park, just south of Vicksburg National Cemetery. It is located on a high bluff about 1,500 feet east of the level plain where the Mississippi River was located in 1863. (The river has since changed course and is now located further southwest as a result of U.S. Army Corps of Engineers projects.) Connecting Avenue lies below the fort. It connects Confederate Avenue (which leads up the hill) with Union Avenue, which lies to the north at Vicksburg National Cemetery. The fort was the anchor of the left flank of the rear Confederate defense line. The fort's position was so strong that the Union Army did not attempt to attack it during the siege in May of 1863.

The sharp rise of ground between Connecting Avenue and Fort Hill is a nearly vertical cliff that lacks adequate vegetative cover and often leaves the loess soil exposed and vulnerable to runoff from heavy rains. Currently, severe erosion is causing the loess soil between Connecting Avenue and Fort Hill to erode and slump, threatening both the fort and road and thus, threatening the fabric of the cultural landscape.

TOPOGRAPHY AND SOILS

The topography of the project area is characterized by steep slopes rising from the Mississippi River. The elevation of the site ranges from approximately 170 feet mean sea level to 280 feet mean seam level. This region contains the thickest deposits of loess soil in the Tennessee-Mississippi-Louisiana area (USDA, 1964; Walker, 2004).

The project area lies west of the base of Fort Hill and extends down to US Highway 61. The site has a typical loess bluff,¹ which has gradually eroded and failed over time. The site has a mild downward slope from east to west. The slope is much steeper to the east of Connecting Avenue up to the summit of Fort Hill. Connecting Avenue was con-

¹ Loess deposits are the result of weathering and wind processes, which occurred after a period of glaciation. As glaciers melted, rivers carried and deposited sediment along the banks of the river. The finer grained sediments then were transported to their current location during windstorms. The wind-transported material is then typically deposited nearby as evidenced by large bluffs of loess deposits.

structed in 1957 and slope failures in the upper portion of this area occurred in 1962 and in 1980.

According to the Warren County Mississippi Soil Survey (1964), soil at the site of the proposed project is identified as Memphis and Natchez silt loams (MnD3) and Gullied land (Gu) (See Figure 8). MnD3 soil is characterized by 8 to 12 percent slopes and severe erosion; whereas, areas of Gullied land are common in steeper regions. These two soil types are part of the Memphis-Natchez-Adler association, which is characterized by well drained and moderately well drained soils of hilly loessal uplands and local silty alluvium. Constituting 60 percent of the county, this association occurs as long, narrow ridges dissected by steep drainageways, on the hilly to steep upland areas. Most of this association is too steep and too susceptible to erosion to be cultivated. The soil has moderately high fertility and is not hydric (USDA, 1964).

The soils in the Memphis-Natchez-Adler association within the project area consist of loess, which is a wind deposited material comprised primarily of silt with some clay and fine sand. Loess covers the upland surfaces along the eastern margin of the Mississippi River alluvial valley. Ranging from a few feet in depth to 200 feet thick, the loess cover is thickest near the bluff edge or adjacent to the Mississippi floodplain. Soils developed over the loess soil are silt loams, primarily grayish brown podzolics of the Alfisol soil group (Walker, 2004).

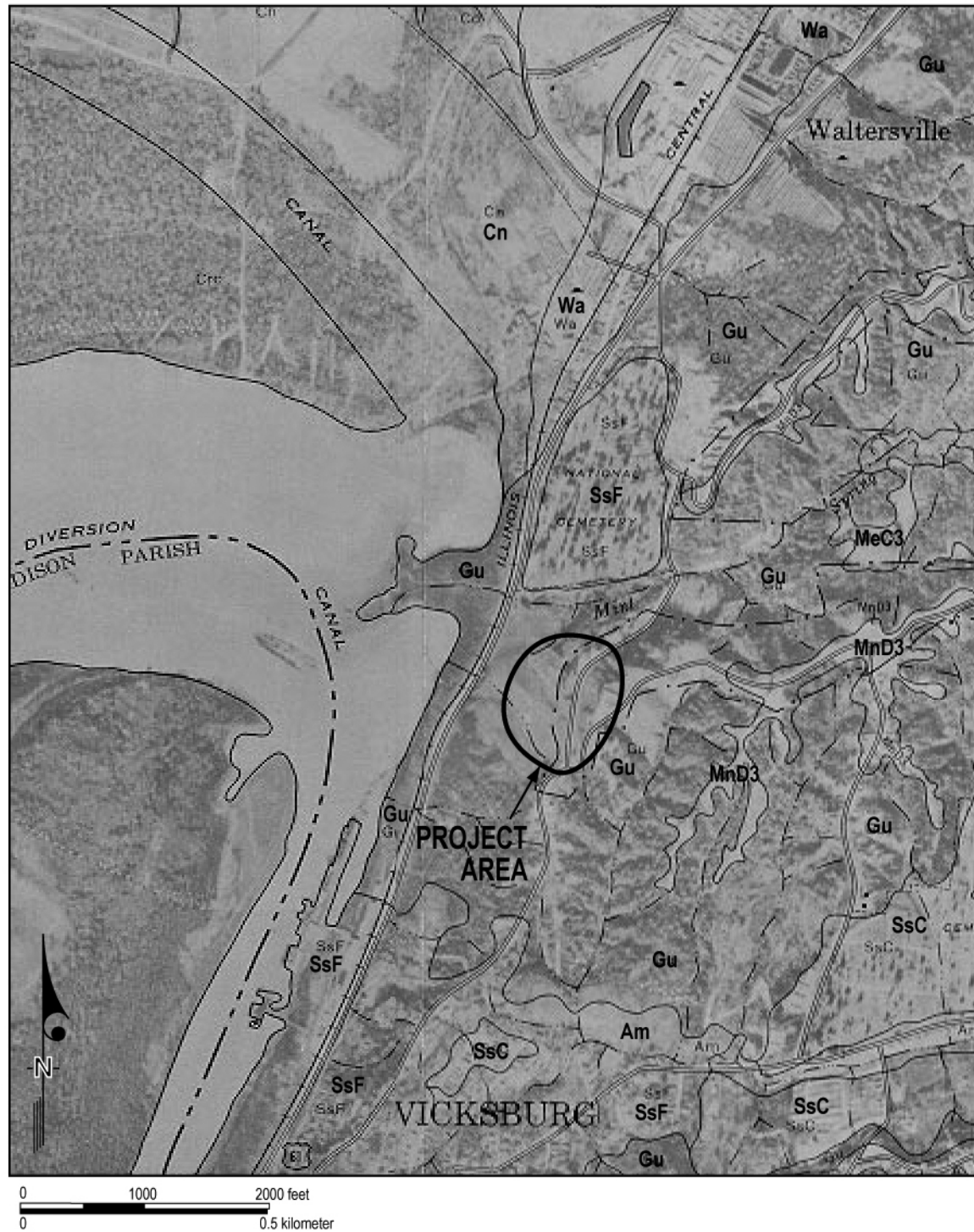
Loess soil is subject to severe erosion in areas that lack adequate vegetative cover and are exposed to runoff from heavy rain events. Runoff and water infiltration may weaken the loess soil and reshape topography. Deep ravines and gullies are created over time as rain causes loss of soil within forested areas (NPS, 2004a). As a result, roads and infrastructures are threatened by the loss of soil occurring at the park.

Furthermore, redirected water flows may cause loess soil to experience a relative increase in strength, while others may experience a decrease (NPS, 2004a; Schnabel, 2004). Sod-forming grasses, which have soil binding fibrous root systems, have commonly been planted in cleared areas to minimize erosion occurring around the park (NPS, 2004a).

Three soil borings performed in December 1980 indicate that the soils underlying this area consist of loess deposits down to an elevation of approximately 520 feet. Surface elevations at the three boring locations range from 506.3 to 584.9 feet.

The loess is generally described as brown silt with trace fine sand. Groundwater readings obtained in the three borings indicate that the groundwater elevation ranged from approximately 490 to 552 feet across the project area at the time the borings were drilled. The higher groundwater elevation was observed in the boring closest to Fort Hill and the lower groundwater elevation was observed in the boring furthest downslope.

Underlying the loess at the site, are wet, medium-stiff clay soils interbedded with wet, loose to medium-stiff sand layers.



Am Adler and Morganfield silt loams, local alluvium
 Cn Commerce silt loam
 Gu Gullied land
 MeC3 Memphis silt loam, 5 to 8 percent slopes, severely eroded

MnD3 Memphis and Natchez silt loams, 8 to 12 percent slopes, severely eroded
 SsC Silty land, rolling
 SsF Silty land, steep
 Wa Wakeland silt loam

Figure 8: Soil Resources within the Project Area.

There are no prime farmland or unique farmland soils, as defined by the Farmland Protection Policy Act (7 U.S.C. 4201), within the project area (USDA, 1964).

WETLANDS

For the purposes of implementing Directors Order #12 (Conservation Planning, Environmental Impact Analysis, and Decision-making), areas that are classified as a wetland habitat according to the U.S. Fish and Wildlife Service's Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979) are subject to the implementation procedures outlined in the "Procedural Manual #77-1: Wetland Protection." A wetland delineation in accordance with the 1987 Army Corps of Engineer's Wetland Delineation Manual was conducted in December 2004. Wetlands, if found, in the project area would be classified according to the Cowardin System, as described in Classification of Wetlands and Deepwater Habitats of the United States (1979).

Two depressional areas, approximately 0.24 acres in size, were found within the project area; however, because these depressional areas did not meet all three of the U.S. Army Corps of Engineers (USACE) parameters (soil, hydrology, and vegetation) for classification as wetland habitat, these areas will most likely be non-jurisdictional. The depressional areas observed in the project area were close to making the classification for palustrine emergent wetlands (PEM) but lacked the required abundance of hydrophytic vegetation needed for this PEM classification. One hydrophyte, the beaked spikerush (*Eleocharis rostellata*), was present within the two depressional areas; however, since beaked spikerush did not constitute greater than 50 percent of the species present, the hydrophytic vegetation criterion based on the USACE 1987 manual was not met. Beaked spikerush constituted approximately 40 to 45 percent of the total species present. Therefore, the observed depressions do not meet the criteria for USACE jurisdiction. The approximate location and extent of the sample points and waters of the United States (R4) are found in Figure 9.

The depressional areas within the project area appear to be driven entirely by surface water, which has most likely been pooled in this region unnaturally through the slumping of the soil and/or soil compaction caused by past grading, filling, and other manipulations. Other past and present site disturbances, such as the use of heavy equipment on the site for building and removing housing structures, may also be contributing to the presence of hydrology in this area. The use of heavy equipment would have caused the soil to become compacted, which would have reduced soil infiltration rates from soil compaction. Heavy rainstorms immediately preceding the field investigations also raised concerns over the normal hydrologic conditions within this area.

There is ample evidence that past and present disturbances in the project area have most likely altered the natural hydrology and soils. Figure 10 shows the development that used to exist within the project area at the base of Fort Hill, between 1895-1905. These structures were removed between 1920 for the construction of a Garbish subdivision (Figure 11). The construction of these building structures followed by their demolition and filling, likely caused significant alterations to the natural topography, hydrologic regime, and soils in the project area (Figure 12). Furthermore, present site distur-

bances continue to occur within the project area. Maintenance, such as mowing, within the project area appears to have been long-term and continuous in occurrence. The removal of vegetation has likely altered the natural vegetation, allowing unnatural plant communities to establish. Severe soil erosion and slumping within the project area has also likely altered the natural topography; therefore, causing depressions in the landscape that are capable of pooling water. For all the reasons, the project area is currently significantly disturbed. Because the project area appears to have been significantly disturbed in the past, it is impossible to determine the natural plant community, hydrologic regime, and soil characteristics that would exist without alteration. However, based on the historic background of the project area, it is reasonable to assume that wetland-like characteristics would develop in the depressional regions within the project area.

The depressional area, labeled A, is 0.01 acres and is located in the northwestern region of the project area (Figures 13 and 14). This area lies in a depressional landscape position indicated by bowl-shaped topography. Vegetation in the Depressional Area A consists of beaked spikerush (Figure 15) and johnson grass (*Sorghum halepense*), which have an indicator status of OBL and FACU, respectively. Beaked spikerush accounted for approximately 40 to 45 percent of the total vegetation cover. The farthest extent of the beaked spikerush was used to delineate the limits of this depression. As noted by the data sheet for DP-A1, the soil has potentially developed hydric characteristics, exhibited by a low chroma color (5 GY 5/1 and 5 GY 4/1), the presence of many prominent mottles (10 YR 5/6), and was saturated within the upper 12 inches. Since soils developed over loess soil are silt loams, which are naturally primarily grayish brown in color, the hydric nature of the soil was questionable. This depressional area connects to a riverine intermittent stream (R4) system, which is 645 linear feet long and flows in a northwest direction downslope (Figure 16).

Another depressional area, labeled B, is 0.23 acres and is located in the southwestern region of the project area (Figures 17 and 18). This area lies in a depressional landscape position indicated by bowl-shaped topography. Vegetation associated with this depression includes beaked spikerush and meadow onion (*Allium canadense*), which have an indicator status of OBL and FACU-, respectively. Beaked spikerush accounted for approximately 40 to 45 percent of the total vegetation cover. As noted by sampling point DP-B1 (see Figure 9), the soil has developed hydric characteristics, exhibited by a low chroma color (10 YR 4/1) and the presence of many prominent mottles (10 YR 5/8). The hydric nature of the soil was questionable. The soil was saturated within the upper 12 inches. This depressional area originates from an approximately 360 linear foot riverine intermittent stream (R4) system, labeled as Stream B (Figures 19 and 20).

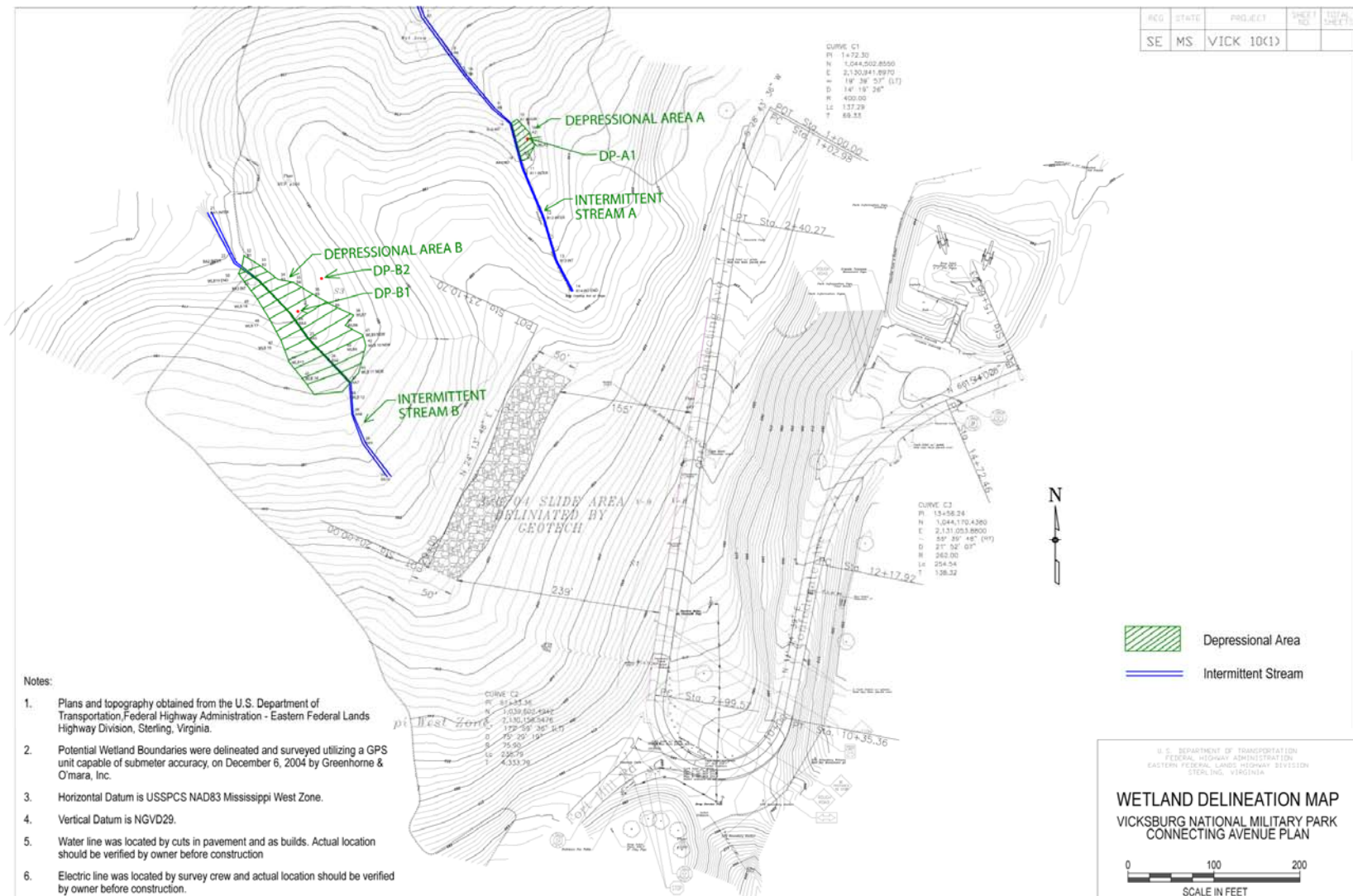


Figure 9. Wetland Delineation Map (not to scale)



Figure 10. Development at base of Fort Hill, between 1895-1905, within the project area. These structures were removed around 1920 for construction of Garbish subdivision. Direction: West



Figure 11. Garbish subdivision as observed from Fort Hill, December 1934. Direction: Southwest

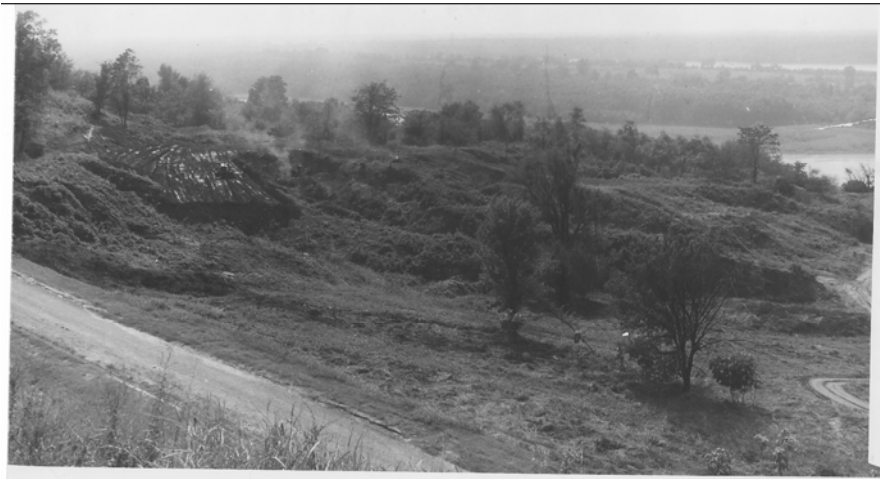


Figure 12. Structures in Garbish subdivision removed in 1939. Entire area shown in this photo was graded following WW II to eliminate rugged topography for inclusion in Vicksburg National Cemetery and future internments of US Service personnel. Direction: Southwest



Figure 13. The 0.01-acre Depressional Area A, located in the project area. Direction: Northwest



Figure 14. An overview of Depressional Area A, located in the depressional landscape. Direction: Northwest



Figure 15. Beaked spikerush (*Eleocharis rostellata*), indicator status is OBL.



Figure 16. Stream A, a 645 linear foot riverine intermittent stream (R4) system, which connects to Depressional Area A Direction: Northwest



Figure 17. The 0.23-acre Depressional Area B, located in the Project Area. Direction: West



Figure 18. Depressional Area B showing the bordering forests. Direction: South



Figure 19. Stream B, A 360 linear foot riverine intermittent stream (R4), which connects to Depressional Area B. Direction: Northwest



Figure 20. Beginning of Intermittent Stream B, located upslope from Depression B Direction: Southeast

GROUNDWATER AND SURFACE WATER

There are two small riverine intermittent streams (R4) systems present in the project area, which are labeled as Stream A and Stream B (Figure 9). Mint Spring Bayou is located approximately 0.2 miles north and down gradient, outside of the project area (USGS, 1971). On-going monitoring studies of the bayous within the park have collected data on temperature, dissolved oxygen, pH, and conductivity. The park's groundwater levels average 3.3 meters or 10.9 feet below the ground surface (NPS, 2004a).

The riverine system, labeled as Intermittent Stream A, is approximately 645 linear feet long, flows in a northwest direction downslope, and connects to the Depressional Area A. The stream is incised up to 3 feet at downstream locations, and in some areas, it averages 2 to 3 feet in width. At downstream locations, or the northwestern portion of the stream, vegetation along the banks includes American sycamore (*Platanus occidentalis*), Japanese honeysuckle (*Lonicera japonica*), black willow (*Salix nigra*), poison ivy (*Toxicodendron radicans*), and box elder (*Acer negundo*). Immediately prior to Depressional Area A, the channel bed of Stream A is made of concrete, which is broken and failing. This concrete channel extends upslope to the beginning of the stream channel.

The riverine system, labeled as Intermittent Stream B, is approximately 360 linear feet long and connects to the Depressional Area B. Stream B is located southeast and upslope from Depressional Area B. After spanning out when it meets this depression, this intermittent stream continues to flow northwest towards the project area boundary. Intermittent Stream B is incised approximately 1 foot upstream and becomes more incised approximately 3 to 4 feet downstream. At the beginning of the stream, the channel is roughly 1 foot wide and becomes wider to approximately 4 feet further downstream after the location of the depressional area.

VEGETATION

In the early part of the 20th century to combat erosion, the Vicksburg National Military Park was revegetated to allow forest to grow within the park's boundaries. The park's General Management Plan acknowledges that although the parkland reflects a succession of clear cutting and farming dating back from the 18th century settlement, most of the cleared fields have since been revegetated and no longer resemble a battlefield. The park's 1996 Resource Management Plan depicts a similar theme. The Resource Management Plan indicates that the vegetative cover has changed the 1863 appearance of the battlefield. Further, it states that the overgrown regions of the park do not reflect the accurate historic scene (NPS, 2004a).

Numerous tree species are present within the park. In areas with little maintenance or clearing, the Vicksburg National Military Park is characterized by southern oak-hickory hardwood forest. Forests stands containing primarily sweet gum (*Liquidambar styraciflua*) and black locust (*Robinia pseudoacacia*) are present throughout the park (NPS, 2004a). Most species diversity is observed in disturbed areas, such as roadsides, lawns, mowed areas, and fields.

Other dominant tree species at the park are the southern red oak (*Quercus falcata*) and white oak (*Quercus alba*). Common overstory trees include the southern sugar maple (*Acer barbatum*), basswood (*Tilia americana*), black oak (*Quercus velutina*), and northern red oak (*Quercus alba*). Common shrub and understory species include ironwood (*Carpinus caroliniana*), redbud (*Cercis canadensis*), pawpaw (*Asimina triloba*), dogwood (*Cornus florida*), sassafras (*Sassafras albidum*), oak-leaved hydrangea (*Hydrangeo quercifolia*), and American hydrangea (*Hydrangea americana*). Herbaceous species commonly observed in the park include christmas fern (*Polystichum acrostickoides*), bedstraw (*Galium aparine*), green trillium (*Trillium viride*), and rattlesnake fern (*Botrychium virginianum*) (Walker, 2004).

Within the Vicksburg National Military Park, there are at least 83 exotic plant species, five of which pose the greatest threat to the ecological processes. These species are kudzu (*Pueraria lobata*), johnsongrass (*Sorghum halepense*), Chinaberry (*Melia azedarach*), Chinese privet (*Ligustrum sinense*), and English Ivy (*Hedera helix*). Invasive plant infestations occurring at Fort Hill are currently monitored under the park's exotic plant management plan (NPS, 2004a).



Figure 21: Loss of Vegetation on Fort Hill.

The project area is comprised of grassed areas. Throughout the existence of the park, heavy rains have caused a large amount of stormwater runoff. Stormwater runoff has caused the grassed areas within the project area to wear away. Because the areas have eroded, the loess soils are left open to the effects of storm events. Recent large storm events have caused the erosion of loess soils, which has caused additional vegetation to be lost (see Figure 21).

Based upon information received from the Mississippi Natural Heritage Program there are two state imperiled plant species that are located approximately within a two mile buffer of the project area. These two plant species are the erect burhead (*Echinodorus rostratus*) and the herbertia (*Herbertia lahue* ssp. *caerulea*). Neither the erect burhead nor the herbertia are listed on the park's inventory. However, the herbertia has been spotted throughout the park, but not in the project area. The park will be monitoring for this spring-blooming plant within the project area in warmer weather.

SAFETY

The loess soil that is found within the Vicksburg area and within the Vicksburg National Military Park has unique properties that allow it to be cut vertically without the need for

bank stabilization. However, if the soil is left unprotected (i.e., vegetative cover is lost) and exposed to rain and moving water, the soil disintegrates causing severe erosion problems. Throughout its existence, the entire park has been at the mercy of the effects of erosion. Within the project area, severe erosion has caused recurring landslides, which have compromised the safety of park employees and visitors. Currently tour buses utilize the avenue as part of their tour route. The buses are oftentimes unable to make the sharp turn from Connecting Avenue to Confederate Avenue without scraping the bus on portions of Connecting Avenue that have slid due to erosion and landslides. NPS employees often have to stabilize portions of this area, which have slumped.

VISITOR USE AND EXPERIENCE

The main unit of the Vicksburg National Military Park encompasses 1,728 acres of land. Within the park, there are 661 monuments; 594 cast iron tablets and position markers; 70 bronze castings; 18,000 headstones located within the Vicksburg National Cemetery; 141 canons; 15 bridges; the ironclad gunboat U.S.S. Cairo and museum; 20 miles of original and reconstructed trenches and earthworks; a 16 mile tour road; and a Visitor Center. Visitors come to the park to visit the monuments, visit the cemetery, to see the U.S.S. Cairo and museum, to exercise. On a whole, visitation to the park has been on the increase to just under one million in 2003 (NPS, 2004f). Approximately 2,000 of the visitors to the park are local residents who utilize the park for exercise, walking, and jogging. Historically, the number of visitors to the park is higher in the spring and summer months than in the fall and winter (NPS, 2004a).

PARK OPERATIONS

In 2004, the Vicksburg National Military Park had an annual operating budget of approximately \$2.4 million. The park is approximately 1,800 acres and in 2003, reported just under one million visitors. The NPS is responsible for managing the park's cultural, natural, and recreational resources, and for interpreting these resources to visitors. They are also responsible for providing for public safety and service. The National Park Service operates a Visitor Center at the main entrance to the park and a Museum at the U.S.S. Cairo Museum. The park is open year round. The park Tour Road, which includes Connecting Avenue, is open from 8 a.m. to dusk and the visitor centers are open every day except Christmas.

The Vicksburg National Military Park is organized into three divisions with a total of 43 staff. The divisions are the administrative division, operations division, and maintenance division. The Operations Division includes visitor and resource protection specialists, interpretation specialists, natural resource management specialists, fee management specialist, museum curation specialists, and cultural resource management specialists. The Maintenance Division is responsible for the upkeep of the cultural landscape and is most visible to the visiting public. Maintaining the cultural landscape requires major input of time, funding, and manpower on the part of park operations in order to maintain historic cleared vistas. Park operations also maintain the ongoing repair after rain events and subsequent slumping (NPS, 2004a).

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ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section describes the environmental consequences associated with each alternative. It is organized by impact topics, which refine the issues and concerns into distinct topics for analysis. These topics allow a standardized comparison between the alternatives based on their impact to the environment. The National Environmental Policy Act (NEPA) of 1969 requires consideration of type, context, duration, intensity, and direct, indirect, and cumulative impacts. NPS policy also requires that “impairment” of park resources be evaluated in all environmental documents.

METHODOLOGY FOR ASSESSING IMPACTS

The terms of potential impacts are described as follows:

- Type - are the effects beneficial or adverse,
- Context - are the effects site-specific, local, or regional,
- Duration - are the effects short-term, lasting less than one year, or long-term, lasting more than one year, and
- Intensity - are the effects negligible, minor, moderate, or major.

Because definitions of intensity (negligible, minor, moderate, major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this environmental assessment. This environmental assessment analyzes the direct and indirect impacts of the proposed action on the natural, cultural, and human environment. However, directness is not specifically labeled or identified in any of the impact topics in this chapter.

CUMULATIVE EFFECTS

The Council on Environmental Quality regulations, which implement NEPA, requires assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

PROJECTS THAT MAKE UP THE CUMULATIVE EFFECTS SCENARIO

As part of the analysis and consideration of potential cumulative impacts, other past, present, and reasonably foreseeable projects were identified. For each project, the NPS considered the potential cumulative effect when combined with the potential impacts of

this project. Various transportation projects, erosion control projects, and battlefield restoration projects have occurred or will be occurring that could cumulatively affect the proposed project. A brief overview of the projects is provided below. The potential for cumulative effects is discussed further in the impact analysis.

TRANSPORTATION PROJECTS

- **South Loop Tour Road** – This proposed project consists of rehabilitation of the Park's three-mile one-way South Loop tour road by reconstructing deteriorated areas of roadway. This would include removing asphalt, base aggregate and loess soil, and replacing them with fill material to obtain desired density for load limits. Work also includes milling four parking areas and three bridges and overlaying 2.8 miles of roadway. Six miles of non-mountable concrete curb would also be installed and repaired or replaced. Fifteen funnel drains to control roadway runoff would also be installed.
- **Park Tour Road** – This proposed project consists of preparing a Type, Size, and Location Report along with design drawings for two historic bridges and obtaining the State Historic Preservation Officer's concurrence.
- **Confederate Avenue** – This proposed project would reconstruct deteriorated areas of Confederate Avenue, overlay asphalt portions, replace failed gutters and curbs, and install new curbs as needed throughout the entire five-mile road to allow for drainage control. Due to the age and the shifting ground conditions of loess soils the concrete has failed in many areas causing road base problems and erosion, which threaten surrounding landscapes.
- **Lovers Lane Access to the Fried and Edward Abraham Property** – This proposed project entails rehabilitating an existing 960-foot roadway within the Park (from Lover's Lane to the Abraham property) to meet FHWA and the American Association of State Highway and Transportation Officials (AASHTO) standards.
- **Graveyard Road** – This proposed project consists of overlaying Graveyard Road with new asphalt.
- **Pemberton Avenue** – This proposed project would consist of repairing sections of the concrete pavement along this road.

EROSION CONTROL PROJECTS

Due to the nature of the loess soils found in and around the Vicksburg National Military Park, a series of soil erosion control projects have been implemented since the inception of the park. In the 1930s, the Civilian Conservation Corps established four camps within the park to complete a series of erosion control projects. These projects entailed installing concrete drains and gutters and included planting a dense forest. The forestation project proved ineffective as tree roots did hold the soil, but exposed roots chan-

neled the water from runoff (VICK, 2001). Throughout the last 60 years, the NPS has had to conduct numerous other mitigation projects in order to combat erosion.

BATTLEFIELD RESTORATION PROJECTS

Until the 1930s, the Vicksburg National Military Park was able to closely resemble the terrain and vegetative pattern that was experienced during the Siege of 1863. However, in 1933, the National Park Service enacted several projects to combat erosion, which included planting nearly 800 acres of trees throughout the park. By the 1980s, due to lack of funding to control invasive tree infestations, woody vegetation encompassed approximately 1,100 acres of the 1,728 acres that make up the park. By 1998, the park decided to return a portion of the park to its pre-1933 condition. These projects included:

- In 1998, the park cleared 13 acres along the South Loop and cleared 5 acres of tree cover in the vicinity of the Louisiana Monument.
- In 2003, the park cleared trails that had become overgrown since the 1980s near and including the Old Jackson Road. In addition, a preventative maintenance project was instituted directly behind the park ranger's cache. This project cleared land of its tree cover to prevent landslides and from negatively impacting the physical structure of the cache from falling trees.
- In 2003/2004, 14 separate parcels of land along the South Loop totaling 4 acres in size were identified and marked for revegetation. Other projects potentially include revegetating 6.3 acres at Fort Hill.
- In September 2004, the NPS completed an Environmental Assessment for the removal of approximately ten acres of forest in the area of the Railroad Redoubt. The comment period for the Environmental Assessment has passed, but as of the writing of this Environmental Assessment no decision document has been approved.

IMPAIRMENT TO PARK RESOURCES AND VALUES

The NPS' *Management Policies, 2001* (2000a), require analysis of potential effects to determine whether actions would impair park resources. The fundamental purpose of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts to park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and as appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired unless a particular law directly and specifically

provides otherwise. The prohibited impairment is an impact that, in the best professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to any park resource or value may constitute impairment; however, an impact would more likely constitute an impairment by having a major adverse effect upon a resource or value whose conservation is as follows:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. The NPS does not analyze visitor experience and use, socioeconomic values, or park operations for impairment. A determination of impairment is made in the conclusion statement in the impact analysis of each action alternative.

IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR Part 800, *Protection of Historic Properties*), impacts to cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected, National Register eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is

an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision Making* (Director's Order #12; NPS, 2001) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. According to NPS DO-28, there are five types of cultural resources – cultural landscapes, historic structures, archeological resources, museum objects, and ethnographic resources, and they are all non-renewable. Adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

IMPACTS ON CULTURAL LANDSCAPES

DEFINITION OF INTENSITY LEVELS

For purposes of analyzing potential impacts to cultural landscapes, the thresholds of change for the intensity of an impact are defined as follows:

- *negligible*: Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.
- *minor*: Adverse impact – impact(s) would alter a pattern(s) or feature(s) of the cultural landscape but would not diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial impact – preservation of landscape patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*. For purposes of Section 106, the determination of effect would be *no adverse effect*.

- *moderate*: Adverse impact - impact(s) would alter a pattern(s) or feature(s) of the cultural landscape, diminishing the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be *adverse effect*. A Memorandum of Agreement is executed between the NPS and applicable State or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). The mitigation measures identified in the Memorandum of Agreement would reduce the intensity of impact from major to moderate.

Beneficial impact – rehabilitation of a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*. For purposes of Section 106, the determination of effect would be *no adverse effect*.

- *major*. Adverse impact - impact(s) would alter a pattern(s) or feature(s) of the cultural landscape, diminishing the overall integrity of the resource. For purposes of Section 106, the determination of effect would be *adverse effect*. The NPS and applicable State or tribal historic preservation officer would be unable to negotiate and execute a Memorandum of Agreement in accordance with 36 CFR 800.6(b).

Beneficial impact – restoration of a landscape or its patterns and features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action, the repair and stabilization of Connecting Avenue would not take place. The No-Action Alternative would not correct the continued slumping of the loess soil on Fort Hill. This, in addition to the continued erosion that is prevalent in this area, would create a moderate long-term adverse impact to the cultural landscape. Connecting Avenue, the hillside, and Fort Hill are within the cultural landscape.

Cumulative Effects. The Park Tour Road transportation projects would potentially impact the cultural landscape. This impact would be minor, long-term and adverse. Erosion control projects have adversely impacted the cultural landscape in the past. The No-Action Alternative would add a perceptible adverse component to these overall moderate adverse cumulative effects. The battlefield rehabilitation projects have beneficially impacted the cultural landscape by attempting to restore the park to its wartime setting. The No-Action Alternative, in conjunction with these actions, would add a perceptible adverse component to overall moderate beneficial cumulative effects.

Conclusion. The No-Action Alternative would affect the cultural landscape of the Fort Hill area creating a moderate long-term adverse impact. The No-Action Alternative would add a perceptible adverse component to overall moderate adverse and beneficial cumulative effects. No impairment to park resources or values would occur.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a shear key buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be in-

stalled in the area of the buttress, and it would outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

Under Alternative B, disturbance to the physical landscape would not occur beyond the current development footprint, which is a mowed grassy area. No woodlands would be directly affected by this action. In addition, any disruptions to vehicular flow through the area would be kept as minimal as possible. Minor short-term adverse impacts from construction would occur to the cultural landscape as the area is excavated for installation of the Shear Key buttress. However, Alternative B would protect both Connecting Avenue and Fort Hill from further damage as a result of slumping loess soils. After construction, the project area would be revegetated with grasses similar to those that currently exist. With revegetation of the project area after construction, Alternative B would have a moderate long-term beneficial impact to the cultural landscape.

Cumulative Effects. The Park Tour Road transportation project would potentially adversely impact the cultural landscape. Erosion control projects have adversely impacted the cultural landscape in the past. The battlefield rehabilitation projects have beneficially impacted the cultural landscape by attempting to restore the park to its war-time setting. Alternative B, in conjunction with these actions, would add a perceptible beneficial component to overall minor adverse and moderate beneficial cumulative effects.

Conclusion. Alternative B would create a minor short-term adverse impact to the cultural landscape during construction. With revegetation of the project area after construction, Alternative B would have a moderate long-term beneficial impact to the cultural landscape. Alternative B would add a perceptible beneficial component to overall minor adverse and moderate beneficial cumulative effects.

Because there would be no major, adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing of legislation of the Vicksburg National Military Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning document, there would be no impairment of the park's resources or values.

IMPACTS ON TOPOGRAPHY AND SOILS

DEFINITIONS OF INTENSITY LEVELS

The thresholds of change for intensity of an impact are defined below:

- *negligible:* The impact to topography is at the lowest levels of detection, barely measurable with no perceptible effects. Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight and no long-term effects to soils would occur.

- *minor:* The impact to topography is slight but detectable, with few perceptible effects, and localized in area. The effects to soils would be detectable. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- *moderate:* The impact to topography is readily apparent and measurable. The effect on soil productivity or fertility would be readily apparent, likely long-term, and result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.
- *major:* The impact to topography is severely adverse. The change is readily apparent, and the resource would be permanently altered from existing conditions. The effect on soil productivity or fertility would be readily apparent, long-term, and substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

Duration: Short-term – Recovers in less than three years; Long-term – Takes longer than three years to recover.

ALTERNATIVE A – NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the repair and stabilization of Connecting Avenue would not take place. As a result, no construction would occur that would impact topography or soils. However, Fort Hill and the adjacent topography would most likely continue to experience similar slope failures as observed in the past. The loess soil in the project area would continue to erode, reshaping the existing topography until an equilibrium is reached or a stiffer more erosion-resistant soil material is exposed. The loss of ground is anticipated to cause failure of a larger section of the hillside, which would possibly lead to impassible roads and unsafe slope conditions. In addition, slope failure would continue as a result of infiltration of groundwater into loess soils present at the site. This is due to heavy rain events, unfavorable surface grading, and malfunctioning or inoperative drainage systems.

Periodic repairs would most likely be necessary over time to maintain the current function of Connecting Avenue. Under the No-Action Alternative slope failures might occur both above and below Connecting Avenue. A large failure resulting in the loss of use of Connecting Avenue would most likely occur after a long period of saturating rain. Continuous progressive failures or an extreme slope failure might possibly adversely impact the stability of Fort Hill.

Due to these impacts, this alternative would have the potential to cause moderate long-term adverse impacts to topography and soils.

Cumulative Effects. While erosion control projects consisting of planting a forest within the park were intended to beneficially impact topography and soils, these projects have created moderate adverse effects because exposed tree roots channeled the water from runoff causing additional erosion. Proposed transportation projects are intended to address poor road conditions due to erosion and age; therefore, a moderate beneficial impact is anticipated. Battlefield restoration projects are anticipated to create moderate beneficial effects by restoring battlefields to their wartime condition, which would remove trees, which have caused erosion within the park. The No-Action Alternative, in conjunction with these actions, would add a perceptible adverse component to overall moderate adverse and beneficial cumulative effects.

Conclusion. Under the No-Action Alternative, minor to moderate long-term adverse impacts to topography and soils would continue because of the soil erosion and slumping of the topography occurring within the project area. The No-Action Alternative would add a perceptible adverse component to overall moderate adverse and beneficial cumulative effects. There would be no impairment to park resources or values nor would this level of impact be sufficient to constitute an impairment of park resources or values.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a shear key buttress, 200 feet below and roughly parallel to Connecting Avenue. The buttress would extend through the loess soils into the terrace soils of the site. The purpose of this buttress would be to provide additional shear resistance against future failures. A base drain would be installed in the area of the buttress, and it would outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

Disturbance to the physical landscape would result from implementation of Alternative B in the development area. This includes the buttress area, the area where new drains would be installed to discharge downslope, areas for staging construction equipment, a temporary access road area, construction lay-down areas, and any repair areas for Connecting Avenue. This disturbance might possibly provide a mechanism for additional water infiltration to the underlying loess soils. A minor to moderate adverse impact would occur during construction because of decreased stability of the soils and increased erosion of the soils. However, once the repair is completed and the site is restored and re-vegetated, the long-term impact would be anticipated to be negligible.

The elevation and variation in the existing groundwater level might be modified once the buttress is completed. The buttress and the drains might serve to slightly reduce groundwater levels in upslope portions of the site. As a result, the soils might experience a relative increase in strength in regards to slope stability causing a minor to moderate long-term beneficial impact. However, the underlying soils might also experience an increase in the effective overburden pressure acting on these soils. This increase in the effective overburden pressure might result in compression of these soils and conse-

quently observed settlement at the ground surface. A minor to moderate long-term adverse impact is anticipated depending on the acceptable threshold of movements.

Introducing surcharge loads during construction and the introduction of man-induced vibrations to the soil (i.e. heavy construction equipment) might impact the soils at the site, particularly when the soils are wet or saturated. The slope currently has a marginal factor of safety as is evidenced by the slope failures. Additionally, loess soils can be prone to slope instability or collapse under dynamic loading. A minor to moderate short-term adverse impact is expected during construction. A construction sequence plan would be implemented to control soil instability and avoid collapse of the cut sections and slope during construction. The construction sequence would consist of closed-sequenced excavation conducted in phases that consist of cutting a limited distance (approximately 30 feet) at one time. Excavations would be filled by the end of the day and no cut would be left open over night.

High dynamic loading of soils (i.e. earthquake) below the groundwater level has been known to cause liquefaction at near surface depths (less than 30 feet). The buttress would be a flexible system that has a capability of sustaining large deformations and rearranging itself within the bench area. A horizontal acceleration of 0.035 was estimated for the project area and would be checked. However, the installation of the buttress might lower groundwater levels above the buttress and thus help to reduce the possibility for liquefaction in locations upslope of the buttress. The impact from this alternative upslope of the buttress is anticipated to be minor, beneficial, and long-term.

Conversely, groundwater within the soils below the buttress outlet drains might become higher than the current condition. This might result in an unfavorable affect on these soils. Impacts may range from negligible to moderate, long-term, and adverse depending on the site seismicity.

The existing site soils (loess) can be highly erosive and unstable. Changes in site topography (i.e. erosion and stability) might be aggravated or exacerbated because the construction of the shear key buttress would require deep excavations with relatively steep temporary slopes. The impact during construction would be minor to moderate, short-term, and adverse. Adherence to and implementation of phased construction and strict sediment and erosion control measures could minimize the impact.

Out-letting of drainage pipes downslope, as shown on the plans would pose a minor to moderate long-term adverse impact to the site topography and soils downslope. Uncontrolled point discharging of groundwater could result in localized erosion and formation of erosion channels. These channels could also provide favorable seepage flow paths into the underlying loess soils. Additional seepage of water downslope might result in slope instability at points below the shear key buttress, which currently may be stable. The impact could be minimized by out-letting all drainage pipes to an existing stream or storm structure.

Cumulative Effects. While erosion control projects consisting of planting a forest within the park were intended to beneficially impact topography and soils, these projects have

created moderate adverse effects because exposed tree roots channeled the water from runoff. Proposed transportation projects are intended to address poor road conditions due to erosion and age; therefore, a moderate beneficial impact is anticipated. Battlefield restoration projects are anticipated to create moderate beneficial effects by restoring battlefields to their wartime condition, which would remove tree vegetation, which has caused erosion within the park. Alternative B, in conjunction with these alternatives, would add a perceptible adverse and beneficial component to the overall moderate adverse and beneficial cumulative effects.

Conclusion. Impacts to topography or soils within the project area would result in minor to moderate long-term adverse impacts and moderate long-term beneficial impacts. Alternative B would add a perceptible adverse and beneficial component to the overall moderate adverse and beneficial cumulative effects.

Because there would be no major, adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Vicksburg National Military Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

IMPACTS ON WETLANDS

DEFINITIONS OF INTENSITY LEVELS

The project team based the impact analysis and the conclusions for possible impacts to wetlands from on-site investigations, review of the National Wetlands Inventory, and the professional judgment of the park staff. The thresholds of change for the intensity of impacts on wetlands are defined as follows:

- *negligible*: No measurable or perceptible changes in wetland size, integrity, or continuity would occur.
- *minor*: The impact to wetlands would be measurable or perceptible, but slight. A small change in size, physical or biological characteristics, or function and value of the wetland could incur effects. However, the overall viability of the resource would not be affected.
- *moderate*: The impact would be sufficient to cause a measurable change in the size, physical or biological characteristics, or function and value of the wetlands or would result in a small, but permanent loss in wetland acreage.
- *major*: The action would result in a measurable change in all three parameters (size, physical or biological characteristics, and function and value of the wetlands) or a permanent loss of large wetland areas. The impact would be substantial and highly noticeable.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A – NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the actions proposed for this project would not take place. No additional impacts to the depressional areas or riverine intermittent stream systems would occur because no construction related land disturbance or fill would occur. However, the depressional areas and riverine intermittent stream systems may continue to be impacted due to the erosion and sedimentation occurring within the project area. This impact would be minor, long-term, and adverse because the impacts would result in a slight, but detectible change due to the present degraded state of the wetlands.

Cumulative Effects. Proposed transportation improvement projects might result in negligible adverse impacts to wetlands in the short-term due to construction related activities; however, these projects are not anticipated to create direct impacts to wetlands as construction would occur within the current footprint of the roads. Erosion control projects, which entailed planting trees, were intended to beneficially impact wetlands by decreasing erosion or sedimentation within the park; however, over time these projects may have adversely impacted wetlands by increasing erosion/sedimentation and stormwater runoff. This impact is minor in intensity. Battlefield restoration projects are anticipated to moderately beneficially impact wetlands, by decreasing sedimentation and high velocity stormwater runoff received by wetlands; thus, increasing wetland quality. The No-Action Alternative, in conjunction with these projects, would add a perceptible adverse component to the overall cumulative effects.

Conclusion. No impact to wetlands would occur under the No-Action Alternative. However, the depressional areas and riverine intermittent stream systems may continue to be impacted due to the erosion and sedimentation occurring within the project area. This impact would be minor, long-term, and adverse because the impacts would result in a detectable change, but slight. The No-Action Alternative would add a perceptible adverse component to the overall cumulative effects. There would be no impairment to park resources or values.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Under Alternative B, no construction activities are proposed within the depressional area or riverine intermittent stream system boundaries. Stormwater runoff from construction would be controlled through implementation of a sediment and erosion control plan to minimize impacts to water quality. The placement of temporary piping covered with filter fabric and an aggregate base would prevent the construction staging area from adversely impacting the depressional area and riverine Intermittent Stream A. An appropriate stormwater permit prior to construction would need to be obtained from Mississippi Department of Environmental Quality. After construction, two outfalls placed

below the buttress would discharge into the Intermittent Streams A and B, which flow into Depressional Areas A and B, respectively. Discharge from the proposed outfalls into Streams A and B would be controlled with appropriate stormwater management control measures, such as riprap basins, to diffuse the discharged water and reduce the water velocity. Therefore, erosion or sedimentation would not occur and hydrology would not be affected. The amount of water discharged into the intermittent streams would be approximately the same as before the installation of the buttress, as indicated by the topography in the project area. This impact to the depressional areas and riverine intermittent stream systems would be minor, long-term, and beneficial.

Cumulative Effects. Proposed transportation improvement projects would result in minor adverse impacts to wetlands in the short-term due to construction related activities; however, these projects are not anticipated to create direct impacts to wetlands as construction would occur within the current footprint of the roads. Erosion control projects, which entailed planting trees, were intended to beneficially impact wetlands by decreasing erosion or sedimentation within the park; however, over time these projects may have adversely impacted wetlands by increasing erosion/sedimentation and stormwater runoff. This impact is minor in intensity. Battlefield restoration projects are anticipated to moderately beneficially impact wetlands, by decreasing sedimentation and high velocity stormwater runoff received by wetlands; thus, increasing wetland quality. Alternative B, in conjunction with these projects, would add a perceptible minor long-term beneficial component to the overall cumulative effects.

Conclusion. Alternative B would have minor long-term beneficial impacts to the depressional areas and riverine intermittent stream systems. Stormwater management control measures, such as the installation of two riprap basins at the discharge locations, would control the location of water input into the intermittent streams, reduce the water velocity into the depressional areas, and decrease erosion or sedimentation. The amount of water discharged into the intermittent streams would be approximately the same as before the installation of the buttress, as indicated by the topography in the project area. Alternative B would add a minor long-term beneficial component to the overall cumulative effects. According to Procedural Manual 77-1: Wetland Protection, Section 4.1.B, activities with beneficial impacts to wetlands do not require the preparation of a Statement of Findings for Wetlands; therefore, a Statement of Findings was not prepared for this project.

Because there would be no major, adverse impacts to resources or values whose conservation are: (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Vicksburg National Military Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning document, there would be no impairment of the park's resources or values.

IMPACTS TO GROUNDWATER AND SURFACE WATER

DEFINITIONS OF INTENSITY LEVELS

The project team based the impact analysis and the conclusions for possible impacts to groundwater and surface water from technical reports on the Vicksburg National Military Park and the professional judgment of the park staff. The thresholds of change for the intensity of impacts on water quality are defined as follows:

- *negligible*: No measurable or perceptible changes in groundwater or surface water would occur. Impacts are chemical, physical, or biological effects that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions.
- *minor*: The impacts (chemical, physical, or biological effects) to groundwater or surface water would be measurable or perceptible, but impacts would be well below water quality standards and within historical baseline or desired water quality conditions would be altered on a short-term basis. A detectable change in water quality would occur from effects such as increased or decreased loads of sediment, debris, chemicals, or nutrients.
- *moderate*: The impacts (chemical, physical, or biological effects) would be a clearly detectable change on groundwater or surface water that potentially could affect organisms or natural ecological processes. Impacts would be at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be altered on a short-term basis.
- *major*: The action would result in a substantial chemical, physical, or biological effects on groundwater or surface water and would be frequently altered from the historical baseline or desired water quality conditions or standards, which would be exceed a short-term basis. The action would potentially affect organisms or natural ecological processes.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A – NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the actions proposed for this project would not take place. However, the water quality of nearby surface waters or groundwater might continue to be impacted by sedimentation due to the erosion continually occurring within the project area. This impact would be minor, long-term, and adverse because the impacts would be slight but detectable due to the present degraded state of the streams.

Cumulative Effects. Transportation improvement projects would adversely affect water resources in the short-term due to construction related activities. This impact is antici-

pated to be minor. Erosion control projects were intended to beneficially impact water resources within the park; however, over time, these projects have adversely impacted water resources by increasing stormwater runoff. This impact is minor in intensity. Battlefield restoration projects are anticipated to moderately beneficially impact water resources. The No-Action Alternative, in conjunction with these projects, would add a perceptible adverse component to the cumulative effects.

Conclusion. Without the stabilization of Connecting Avenue, erosion would continue to have minor, long-term, adverse impacts to water quality. The No-Action Alternative would add a perceptible adverse component to the cumulative effects. No impairment to park resources or values would occur.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a shear key buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress, and it would outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

Installation of the buttress would most likely lower groundwater levels and thus minimize the potential for liquefaction as a result of seismic events (earthquakes) for locations upslope from the buttress. The construction of the proposed drainage pipes would presumably lower groundwater levels upslope of the buttress, which would improve slope stability and reduce the potential for slope failures. As a consequence of lowering groundwater levels, the existing soil above the buttress might weaken and increase overburden loads on the underlying soils. This weakening might occur as a result of water loss within the soil. Lowering the groundwater might also result in upslope ground settlements. Construction of the drainage pipes would most likely result in minor long-term impacts to groundwater. The impact would be beneficial and adverse because the construction of the drainage pipes and buttress would potentially provide slope stability and reduce slope failures but would also potentially lower groundwater levels causing the soil above the buttress to weaken and settle.

In addition, no construction or operational activities are proposed within the riverine intermittent stream channels. However, the removal of vegetation during construction would create exposed soil and cause additional erosion, which could cause increased sedimentation in surface waters. Stormwater runoff from construction would be controlled through implementation of a sediment and erosion control plan to minimize impacts to water quality. An appropriate stormwater permit prior to construction would need to be obtained from Mississippi Department of Environmental Quality. The construction staging area, which would be located southeast of Intermittent Stream A, has the potential to impact this stream; however, with the placement of temporary piping covered with filter fabric and aggregate base, there would be no impact during construction to Intermittent Stream A. Two outfalls placed below the buttress would discharge into the Intermittent Streams A and B, which flow into Depressional Areas A and B, re-

spectively. Discharge from the proposed outfalls into Streams A and B would be installed along with appropriate stormwater management control measures. Appropriate stormwater management control measures would diffuse the discharged water and reduce the water velocity; therefore, erosion or sedimentation would not occur, and the stream hydrology would not be affected. This impact to groundwater and surface water would be minor, long-term, and beneficial.

Cumulative Effects. Transportation improvement projects would adversely affect water resources in the short-term due to construction related activities. This impact is anticipated to be minor. Erosion control projects were intended to beneficially impact water resources within the park; however, over time, these projects have adversely impacted water resources by increasing stormwater runoff. This impact is minor in intensity. Battlefield restoration projects are anticipated to moderately beneficially impact water resources. Alternative B, in conjunction with these projects, would add a perceptible minor long-term beneficial and adverse component to the overall cumulative effects.

Conclusion. Alternative B would have minor long-term beneficial and adverse impacts to groundwater and surface water. Beneficial impacts to surface water would result from the installation of appropriate stormwater management control measures, which would control water velocity into these streams, and decrease erosion or sedimentation. In addition, the construction of the drainage pipes and the buttress would potentially provide slope stability and reduce slope failures. Conversely, adverse impacts would occur because construction of the drainage pipes and buttress would potentially lower groundwater levels causing the soil above the buttress to weaken and settle. The amount of water discharged into the streams would be approximately the same as before the installation of the buttress, as indicated by the topography in the project area. Alternative B would add a minor long-term beneficial and adverse component to the overall cumulative effects.

Because there would be no major, adverse impacts to resources or values whose conservation are: (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Vicksburg National Military Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning document, there would be no impairment of the park's resources or values.

IMPACTS ON VEGETATION

DEFINITIONS OF INTENSITY LEVELS

Analyses of the potential intensity of impacts to vegetation were derived from available information on the Vicksburg National Military Park and the professional judgment of the park staff. The thresholds of change for intensity of impacts are defined as follows:

- *negligible:* An impact that may result in a change in vegetation, but the change would be at the lowest level of detection or not measurable. Ecological processes would not be affected.

- *minor*: An impact that would result in a detectable change, but the change would be slight and have a localized effect on a population. This could include changes in the abundance or distribution of individuals in a localized area, but not changes that affect the viability of local populations. Changes to localized ecological processes would be minimal.
- *moderate*: An impact that would result in a clearly detectable change in a population and could have an appreciable effect. This could include changes in the abundance or distribution of local populations but not changes that affect the viability of regional populations. Changes to localized ecological processes would be of limited extent.
- *major*: An impact that would be severely adverse or exceptionally beneficial to a population. These impacts would be substantial, highly noticeable, and may result in widespread change and be permanent in nature. This could include changes in the abundance or distribution of a local or regional population to the extent that the population would not likely to recover (adverse) or would return to a sustainable level (beneficial). Significant ecological processes would be altered, and landscape-level changes would be expected.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A – NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the repair and stabilization of Connecting Avenue would not take place. Vegetation would not be impacted by construction, since the repair and stabilization of Connecting Avenue would not occur. However, the soil within the project area would continue to erode, which would affect the ability for vegetation to grow. Therefore, the No-Action Alternative would have long-term, adverse impacts to vegetation. These impacts would be minor because the impacts would be a localized detectable change to vegetation.

Cumulative Effects. Proposed transportation improvement projects are not anticipated to create impacts to vegetation as construction would occur within the current footprint of the roads. Erosion control projects created additional forested areas within the park to combat the effects of erosion, which created a beneficial impact to vegetation. Battlefield restoration projects, while they would remove forested lands from specific areas within the park, these areas would be revegetated with native grasses. This impact would be moderate and beneficial. The No-Action Alternative, in conjunction with these actions, would add a perceptible adverse component to the overall moderate beneficial cumulative effects.

Conclusion. Under the No-Action Alternative, vegetation would continue to be impacted by erosion occurring within the project area. These impacts would be minor, long-term, and adverse. The No-Action Alternative would add a perceptible adverse component to

the overall moderate beneficial cumulative effects. No impairment to park resources and values would occur.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a shear key buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress, and it would outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

Under Alternative B, vegetation would be removed during construction, but it would be replaced after construction is complete with landscape grass to help control erosion. Therefore, the impact to vegetation within the project area would be minor, short-term, and adverse. Construction would occur during drier periods of the year to prevent additional erosion and loss of vegetation during construction. Because Alternative B would also prevent further soil erosion and thus vegetation impacts, the project would also have a beneficial impact on vegetation. These impacts would be minor and long-term because the impacts would result in a localized detectable change in vegetation.

Cumulative Effects. Proposed transportation improvement projects are not anticipated to create impacts to vegetation, as construction would occur within the current footprint of the roads. Erosion control projects created additional forested areas within the park to combat the effects of erosion, which created a beneficial impact to vegetation. Battlefield restoration projects, while they would remove forested lands from specific areas within the park, these areas would be revegetated with native grasses. This impact would be moderate and beneficial. Alternative B, in conjunction with these actions, would add a perceptible beneficial component to the overall moderate beneficial cumulative effects.

Conclusion. Under Alternative B, there would be minor short-term adverse impacts to vegetation from the removal of vegetation during construction. Alternative B would prevent further soil erosion; therefore, a minor long-term beneficial impact would occur. Alternative B would add a perceptible beneficial component to the overall moderate beneficial cumulative effects.

Because there would be no major, adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Vicksburg National Military Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

IMPACTS ON SAFETY

DEFINITIONS OF INTENSITY LEVELS

Analyses of the potential intensity of impacts on safety were derived from the available information on the park, and the professional judgment of the park staff. The thresholds of change for the intensity of impacts on safety are defined as follows:

- *negligible*: Safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on safety.
- *minor*: The effect would be detectable, but would not have an appreciable effect on safety. If mitigation was needed, it would be relatively simple and would likely be successful.
- *moderate*: The effects would be readily apparent and would result in substantial, noticeable effects to safety on a local scale. Mitigation measures would probably be necessary and would likely be successful.
- *major*: The effects would be readily apparent and would result in substantial, noticeable effects to safety on a regional scale. Extensive mitigation measures would be needed and their success would not be guaranteed.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the repair and stabilization of Connecting Avenue would not take place. The NPS would continue management actions that would include spot repairs to maintain Connecting Avenue and Fort Hill. The No-Action Alternative would not correct the continued slumping and erosion of the loess soil. The slumping of Fort Hill has caused Connecting Avenue to buckle. Connecting Avenue would continue to buckle and present a safety risk to park staff and the visiting public. Therefore, a moderate long-term adverse impact to visitor and park staff safety would occur.

Cumulative Effects. Effects of other projects including transportation improvement projects, and battlefield restoration projects might have the potential to create minor beneficial impacts to the safety of park employees and visitors. Erosion control projects were intended to stop erosion and, thus, beneficially impact safety of park visitors and employees. However, over time, these projects have impacted the safety of park visitors and employees because tree roots channeled the water from runoff causing severe erosion throughout the park; therefore, a moderate adverse impact has occurred. The No-Action Alternative, in conjunction with these actions, would contribute a measurable adverse increment to the overall minor beneficial and adverse cumulative effects.

Conclusion. Moderate long-term adverse impacts to visitor and park staff safety would occur. Connecting Avenue would continue to buckle due to erosion and slumping of loess soils on Fort Hill. The No-Action Alternative would add a perceptible adverse component to overall minor beneficial cumulative effects.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a toe buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress with an outlet at both ends of the buttress for drainage. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

These actions would beneficially impact park staff and visitor safety by addressing the problem of erosion, which is causing Fort Hill to slump, and ultimately causes Connecting Avenue to buckle. Tour buses and cars would be able to drive through this area of the park and not run the risk of scraping their vehicles on the asphalt pavement. Furthermore, park staff would no longer have to stabilize portions of this area, which have slumped; therefore, no longer compromising their safety. These impacts would be moderate, long-term, and beneficial because the impacts would be detectable to visitors and park staff.

Cumulative effects. Effects of other projects including transportation improvement projects, and battlefield restoration projects might have the potential to create minor beneficial impacts to the safety of park employees and visitors. Erosion control projects were intended to stop erosion and, thus, beneficially impact safety of park visitors and employees. However, over time, these projects have impacted the safety of park visitors and employees because tree roots channeled the water from runoff causing severe erosion throughout the park; therefore, a moderate adverse impact has occurred. Alternative B, in conjunction with these actions, would contribute a measurable beneficial increment to the overall minor beneficial and adverse cumulative effect.

Conclusion. With Alternative B, park staff and visitors would experience moderate long-term beneficial impacts to their safety because the problem associated with erosion and slumping of Fort Hill, which is causing Connecting Avenue to buckle would be addressed. Alternative B would contribute a measurable beneficial increment to the overall minor beneficial cumulative effect.

IMPACTS ON VISITOR USE AND EXPERIENCE

DEFINITION OF INTENSITY LEVELS

NPS Management Policies state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks.

Part of the purpose of the Vicksburg National Military Park is, “the preservation and protection of existing earthworks, fortifications, structures, monuments, memorials, and other outstanding natural and historic features within its jurisdiction in such a way as to provide the visitor with a pleasing and rewarding experience...and to further the visitor’s understanding and appreciation of the ordeal experienced by all persons of both North and South at Vicksburg,” (NPS, 1979). Consequently, one of the park’s management goals is to encourage active use of parkland for hiking and bicycling and to communicate the Vicksburg story and other park themes (NPS, 1979).

Public scoping input and observation of visitation patterns combined with assessment of what is available to visitors under current management were used to estimate the effects of the actions in the various alternatives in this document. The impact on the ability of the visitor to experience a full range of park resources was analyzed by examining resources and objectives presented in the park’s significant statement. The potential for change in visitor experience proposed by the alternatives was evaluated by identifying projected increases or decreases in the proposed project and other visitor uses, and determining whether or how these projected changes would affect the desired visitor experience and to what degree and for how long.

- *Negligible*: The impact would be a change that would not be perceptible or would be barely perceptible by most visitors.
- *Minor*: The impact would change a few visitors’ experiences, which would be noticeable, but would result in little distraction or improvements in the quality of the experience.
- *Moderate*: The impact would change a large number of visitors’ experiences and would result in a noticeable decrease or improvement in the quality of the experience. This would be indicated by a change in frustration level or inconvenience for a length of time or an incomplete/inaccurate understanding of the park’s mission and resources.
- *Major*: The impact has a substantial improvement in many visitors’ experiences or a severe drop in the quality of many visitors’ experiences, such as the addition or elimination of a recreational opportunity or a permanent change to an area. The impact would preclude future generations of some visitors from enjoying the park resources.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the repair and stabilization of Connecting Avenue would not take place. Visitor experience would continue to be affected by poor pavement conditions in the project area. Currently, tour buses and vehicles utilize the ave-

nue as part of their tour route. Tour buses and cars are oftentimes unable to make the sharp turn from Connecting Avenue to Confederate Avenue without scraping their vehicles on portions of Connecting Avenue that have slumped due to erosion and landslides. This could damage the undercarriage of visitors cars and tour buses; thereby adversely affecting their visitor experience.

Furthermore, if the erosion were allowed to continue, the cultural landscape in this area of the park would be affected. The landscape of the park is critical for visitors to understand the battle and troop dispositions, the deployment of attacks, and the course of the battle. If Fort Hill and Connecting Avenue were to fail, an important part of the visitor experience would be adversely impacted.

Therefore, the continuation of the No-Action Alternative would have a moderate long-term adverse impact on visitor use and experience. The impact would change the visitor experience and would result in a noticeable decrease to a visitor's overall experience.

Cumulative Effects. Transportation improvements, erosion control projects, and battlefield restoration projects are anticipated to beneficially impact visitor use and experience. These impacts would be minor to moderate in intensity. Transportation projects would enhance the Tour Road. Erosion control projects were designed to help address the impact of erosion so that visitors would be able to understand the Siege of 1863. The battlefield restoration projects provide a better understanding the battle. The No-Action Alternative would add a perceptible adverse impact to the overall minor to moderate beneficial cumulative impact.

Conclusion. The continuation of the No-Action Alternative would have a moderate, long-term, adverse impact on visitor use and experience. The No-Action Alternative would add a perceptible adverse impact to the overall minor to moderate beneficial cumulative impact.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a sheer key buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress with an outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed. By repairing and stabilizing Connecting Avenue and Fort Hill, visitor use and experience within this area would be beneficially impacted by providing a smooth driving experience, thus enhancing the visitor safety and the preservation of a cultural resource that is critical for visitors to understand the ordeal experienced during the Siege of 1863. Therefore, this impact would be moderate, long-term, and beneficial.

Minor short-term adverse impacts to visitor use and experience would occur during construction because this area would have to be closed off during the rehabilitation of Connecting Avenue.

Cumulative Effects. Transportation improvements, erosion control projects, and battlefield restoration projects are anticipated to beneficially impact visitor use and experience. These impacts would be minor to moderate in intensity. Transportation projects would enhance the Tour Road. Erosion control projects were designed to help address the impact of erosion so that visitors would be able to understand the Siege of 1863. The battlefield restoration projects would provide a better understanding the battle. Alternative B would add a perceptible beneficial impact to the overall minor to moderate beneficial cumulative impact.

Conclusion. A moderate long-term beneficial impact would result from the implementation of Alternative B. Minor short-term adverse impacts would occur during construction. Alternative B would add a perceptible beneficial impact to the overall minor to moderate beneficial cumulative impact.

IMPACTS ON PARK OPERATIONS

DEFINITION OF INTENSITY LEVELS

The NPS staff's knowledge regarding operational efficiency, protection and preservation of important resources, and providing an effective visitor experience was used to determine intensity levels of potential impacts on park operations. For purposes of analyzing potential impacts, the thresholds of change for the intensity of an impact are defined as follows:

- *negligible* - park operations would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on park operations.
- *minor* - the effect would be detectable and likely short-term, but would be of a magnitude that would not have an appreciable effect on park operations. If mitigation was needed to offset adverse effects, it would be simple and likely successful.
- *moderate* - the effects would be readily apparent, likely long-term, and would result in a substantial change in park operations in a manner noticeable to staff and to the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful.
- *major* - the effects would be readily apparent and would result in a substantial change in park operation in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed and extensive; their success could not be guaranteed.

Duration: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the repair and stabilization of Connecting Avenue would not take place, which continues the ongoing temporary repairs to Connecting Avenue and the access gate, thus impacting park operations. The No-Action Alternative would not correct the continued slumping and erosion of the loess soil. Park staff would continue to make spot repairs within the project area to combat the erosion and slumping of Connecting Avenue and Fort Hill. Overall, these impacts would be minor to moderate, long-term, and adverse.

Cumulative Effects. Effects of other projects including transportation improvement projects and erosion control projects potentially create a minor to moderate, beneficial impact to park operations. These projects would help reduce the repair work needed on the various roads within the park and it would help reduce the work needed to combat erosion. Battlefield restoration projects are not anticipated to impact park operations. The No-Action Alternative would add a perceptible adverse component to the overall minor to moderate beneficial cumulative effects.

Conclusion. The No-Action Alternative would have a minor to moderate adverse impact to park operations due to repairs that would be conducted in the project area to combat erosion and slumping. The adverse impact of the No-Action Alternative, would add a perceptible adverse component to the overall minor to moderate beneficial cumulative effects.

ALTERNATIVE B – REPAIR OF TOUR ROAD ON CONNECTING AVENUE (PREFERRED ALTERNATIVE)

Alternative B would correct the slumping of Fort Hill by installing a toe buttress, 200 feet below and roughly parallel to Connecting Avenue. A base drain would be installed in the area of the buttress with an outlet at both ends of the buttress. The existing asphalt and aggregate base along Connecting Avenue would be removed and replaced in kind, and a curb and gutter system would be installed.

The actions proposed under Alternative B would provide a sustainable solution to prevent further erosion of Fort Hill. This alternative would also properly stabilize and repair Connecting Avenue to prevent further buckling. Park staff would not need to be removed from their daily duties to handle emergency repairs to this area of the park. This would create moderate long-term beneficial impacts to park operations because the effects would be readily apparent and would result in a substantial change in park operations that would be noticeable to park staff.

Cumulative Effects. Effects of other projects including transportation improvement projects and erosion control projects potentially create a minor to moderate, beneficial impact to park operations. These projects would help reduce the repair work needed on

the various roads within the park and it would help reduce the work needed to combat erosion. Battlefield restoration projects are not anticipated to impact park operations. Alternative B, in conjunction with these actions, would contribute a measurable beneficial increment to the overall minor beneficial cumulative effect.

Conclusion. Providing a sustainable solution to prevent further erosion of Fort Hill and repairing and stabilizing Connecting Avenue would create moderate long-term beneficial impacts to park operations. Alternative B, in conjunction with these actions, would contribute a measurable beneficial increment to the overall minor beneficial cumulative effect.

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CONSULTATION AND COORDINATION

In accordance with Section 106 of the National Historic Preservation Act of 1966, the cultural resources specialist for the Vicksburg National Military Park has initiated consultation with the Mississippi State Historic Preservation Officer.

In accordance with Section 7 of the Endangered Species Act of 1973, comments were solicited from the U.S. Fish and Wildlife Service and the Mississippi Natural Heritage Program on known occurrences of rare, threatened, and endangered species within the project area that could be adversely impacted by the proposed alternatives. Copies of responses received from these agencies are provided in Appendix A.

The Mississippi Department of Environmental Quality (MDEQ), Office of Pollution Control requires that a Storm Water Small Construction General Permit be obtained for projects creating discharges of storm water from activities such as clearing, grading, excavating, and other land disturbing activities equal to or greater than 1 acre and less than 5 acres (total area disturbed over the course of the project). These discharges designated as small construction activities under the National Pollutant Discharge Elimination System (NPDES) storm water program, are automatically covered under the Storm Water Small Construction General Permit. A Small Construction Notice of Intent application form and a Storm Water Pollution Prevention Plan would need to be completed prior to construction. Among other requirements, the Storm Water Pollution Prevention Plan must describe the appropriate erosion and sediment controls implemented for the project as outlined in the permit requirements. In addition, upon notification of a Storm Water Small Construction General Permit submittal, the Permit Board may require an alternate permit be obtained, such as an individual NPDES permit. For this project, the FHWA would need to obtain the appropriate storm water permit, which would include completion of a Small Construction Notice of Intent application form and a Storm Water Pollution Prevention Plan prior to the start of construction. Additionally, the U.S. Army Corps of Engineers (USACE), Vicksburg District may require a permit be obtained for the temporary piping installed in Intermittent Stream A for the staging area. The applicant would need to coordinate with the USACE prior to any construction, and after a Jurisdictional Determination has been confirmed for waters of the U.S. in the project area, to determine what type of permit is required.

This Environmental Assessment would be distributed for public and agency review and comment for a period of at least 30 days. The NPS would consider the comments received during the comment period prior to determining the final decision document that would be set to the Southeast Region Director for approval and signature.

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APPENDIX A

Agency Coordination Letters



United States Department of the Interior

NATIONAL PARK SERVICE
Vicksburg National Military Park
3201 Clay Street
Vicksburg, Mississippi 39183-3495



L76

August 13, 2004

Mr. Curtis James
U.S. Fish and Wildlife Service
6578 Dogwood View Parkway, Suite A
Jackson, MS 39213

Dear Mr. James:

Vicksburg National Military Park, located in Warren County, is preparing an Environmental Assessment (EA) to evaluate potential effects on the natural and human environment resulting from a proposed action that would stabilize a slope that is slumping and causing serious damage to a key park road and a cultural feature known as Fort Hill.

This emergency project is needed to correct a persistent erosion problem affecting the tour road on Connecting Avenue below Fort Hill, which was exacerbated by an eight-inch rainstorm on April 6, 2003. This storm, plus heavier rainfall than normal during the preceding months and earlier this summer, is causing the loess soil under the road to slump downhill. This has resulted in a 220-foot section of road dropping over eight-inches at the scarp line. Corrective action will include installing a rock buttress for a length of 380-feet west of Connecting Ave. The width of the buttress will be ten-feet at the bottom of the trench and fifty-two-feet at the top of the trench, with side slopes being one-half horizontal to one vertical, with an average trench depth of twenty-eight-feet (varying from 22-feet on the west side to 33-feet on the east side). The estimated volume of riprap to be installed in the trench is approximately 9,700 cubic yards. A collector drain with outlet will be constructed on both ends of the buttress. Additional work at Connecting Ave. will include drainage improvements, consisting of curb and gutter construction, pipe culvert replacement, and drainage inlet adjustments/modifications.

Although we are just beginning to gather information for the project, we want to be able to evaluate the potential effect that project implementation may have on threatened and endangered species. In order to meet our Section 7 consultation requirements for the EA, we respectfully request that you provide us with the current listing and locations of endangered, threatened, proposed, and candidate species and their associated critical habitats specific to the project area.

This letter is the first step of consultation for this project to ensure that the planning effort adequately addresses Section 7 requirements related to the EA. When the draft EA is completed, a copy will be sent to you with an official transmittal letter for your review and comment.

We look forward to working cooperatively with you on the planning and implementation of this project.

Sincerely,

Rosie M. Wince
Rosie Wince
Acting Superintendent

<input checked="" type="checkbox"/> No Significant adverse wetland impacts
<input checked="" type="checkbox"/> No listed, proposed or candidate species present
<i>[Signature]</i>
Environmental Coordinator U.S. Fish and Wildlife Service
Log No. <i>04-94</i> Date <i>8/17/04</i>

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20 August 2004

United States Department of the Interior

National Park Service
Vicksburg National Military Park
3201 Clay Street
Vicksburg, MS 39183-3495

Re: Slope Stabilization
Warren County

Ms. Rosie Wince
Acting Superintendent:

In response to your request for information dated 13 August 2004, I have searched our database for occurrences of state or federally listed species and other special concern animals and plants on and within 2 miles of the site referenced above. Three species (with 5 occurrence records) occur within the two-mile buffer associated with this project. These species are considered either imperiled (S2) or critically imperiled (S1). I encourage the preparing of an Environmental Assessment to determine whether the proposed project would adversely impact populations of these species.

SCIENTIFIC NAME	COMMON NAME	FED	STATE	STATE RANK
PHOXINUS ERYTHROGASTER	SOUTHERN REDBELLY DACE		LE	S2
CHAMPION TREE				
ECHINODORUS ROSTRATUS	ERECT BURHEAD			S1
HERBERTIA LAHUE SSP CAERULEA	HERBERTIA			S2

The Mississippi Natural Heritage Program (MNHP) has compiled a database that is the most complete source of information about Mississippi's rare, threatened, endangered or otherwise significant plants, animals, plant communities and natural features. The quantity and quality of data collected by MNHP are dependent on the research and observations of many individuals and organizations. In many cases, this information is not the result of comprehensive or site-specific field surveys; most natural areas in Mississippi have not been thoroughly surveyed, and new occurrences of plant and animal species are often discovered. Heritage reports summarize the existing

Preserving Natural Mississippi

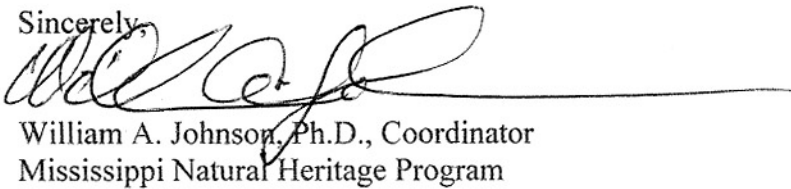
2148 RIVERSIDE DRIVE • JACKSON, MS 39202-1353 • PHONE 601 354-7303 FAX 601 354-7227 • www.mdwfp.state.ms.us/museum

DEPARTMENT OF WILDLIFE, FISHERIES, AND PARKS

information known to the MNHP at the time of the request and cannot always be considered a definitive statement on the presence, absence or condition of biological elements on a particular site.

Please feel free to contact us if we can provide any additional information.

Sincerely,

A handwritten signature in black ink, appearing to read 'W.A. Johnson', followed by a long horizontal line extending to the right.

William A. Johnson, Ph.D., Coordinator
Mississippi Natural Heritage Program



HISTORIC PRESERVATION
PO Box 571, Jackson, MS 39205-0571
601-576-6940 • Fax 601-576-6955
mdah.state.ms.us

January 19, 2005

Terrence J. Winschel
Historian
Vicksburg National Military Park
3201 Clay Street
Vicksburg, Mississippi 39183-3495

Dear Mr. Winschel:

RE: Proposed stabilization and rehabilitation of Connecting Avenue in Vicksburg National Military Park

We have reviewed the above referenced request for cultural resources assessment pursuant to Section 106 of the National Historic Preservation Act and 36 CFR Part 800, which we received on December 20, 2004. We concur with your determination that the proposed stabilization and rehabilitation of Connecting Avenue will result in no adverse effect on the park's cultural resources. We did, however, note with interest the possibility that archaeological resources associated with Fort Nogales may, in the course of the proposed activity, be unearthed. Should members of the park's cultural resources staff identify and/or retrieve any artifacts associated with this resource, we would appreciate being notified immediately.

Should there be additional work in connection with this project, please let us know in order that we may provide you with appropriate comments in compliance with the above referenced regulations. If we can be of further assistance, please do not hesitate to contact this office.

Sincerely,

Kenneth H. P'Pool
Deputy State Historic Preservation Officer

By: Thomas H. Waggener
Review and Compliance Officer

cc: Clearinghouse for Federal Programs

Board of Trustees: William F. Winter, president / Van R. Burnham, Jr. / Arch Dalrymple III / Lynn Crosby Gammill / E. Jackson Garner
Gilbert R. Maron, Sr. / Duncan M. Morgan / Maris D. Ramage, Jr. / Rosemary Taylor Williams / Department Director: Elbert R. Hilliard

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United States Department of the Interior

NATIONAL PARK SERVICE
Southeast Regional Office
Atlanta Federal Center
1924 Building
100 Alabama St., SW.
Atlanta, Georgia 30303



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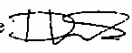
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IN REPLY REFER TO:

H4217 (SER-CR)

January 3, 2005

Memorandum

To: Superintendent, Vicksburg National Military Park
From: Chief, Cultural Resources Division, Southeast Regional Office 
Subject: Section 106 Submittal, Stabilization of Connecting Ave.

We have reviewed your 106 submittal per your request. Enclosed is the signed copy of your

"Assessment of Actions having No Adverse Effect on Cultural Resources" with no comments.

TAKE PRIDE
IN AMERICA 

National Parks

2/27/2005 1:49 PM PAGE 4/018 Fax Server



REPLY REFER TO

United States Department of the Interior

NATIONAL PARK SERVICE
Vicksburg National Military Park
3201 Clay Street
Vicksburg, Mississippi 39183-3495

H4217(VICK)

December 16, 2004

Memorandum

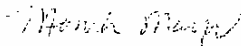
To: Regional Director, Southeast Region

From: Superintendent, Vicksburg National Military Park

Subject: Review and Compliance Form for Stabilization of Connecting Ave.

Attached is a XXX Form requesting approval for proposed stabilization and rehabilitation of Connecting Avenue which, due to slippage along a fault line exacerbated by recent heavy rains, is now closed to vehicular and pedestrian traffic. Connecting Avenue serves as the park's tour road and access to Vicksburg National Cemetery and the U.S.S. Cairo Museum. Personnel from the Southeast Regional Office and Denver Service Center have been involved in the development of this proposal.

Copies of this proposal have also been provided to Dennis McCarthy and Rene Cote of your staff for comment. Please contact me at 601-619-2902 or Terry Winschel, park historian, at 601-619-2908 if you have any questions or need additional information.


Monika Mayr
Superintendent

Attachment

National Parks 2/2/2005 1:49 PM PAGE 5/018 Fax Server

ASSESSMENT OF ACTIONS HAVING AN EFFECT ON CULTURAL RESOURCES

A. DESCRIPTION OF UNDERTAKING

1. Park: Wicksburg National Military Park Park district (optional) _____
2. Work/Project Description:
 a. Project name: Stabilization of Connecting Ave. park project #(s): PRA-WICK 1011
 b. Describe project and area of potential effects (as defined in 36 CFR Part 800.2(c)); explain why work/project is needed.

See Attached Scope of Work

3. Has the area of potential effects been surveyed to identify cultural resources?
 ___ No
X Yes: Source or Reference: Blakeston and Collins, 1975
 ___ Check here if no known cultural resources were affected. (If area has been disturbed in the past, please explain or attach additional sheets to describe nature, extent, and intensity of disturbance.) See Attached
4. Affected Resource(s):
 Name and number(s): topography location: base of Fort Hill NR status: WNMP is on the Register, but topography is not listed separately
 Name and number(s): _____ location: _____ NR status: _____
 (REPEAT FOR EACH AFFECTED RESOURCE)
5. The proposed action will: (Check as many as apply.)
 ___ Destroy, remove, or alter features/elements from a historic structure
 ___ Replace historic features/elements in kind
 ___ Add nonhistoric features/elements to a historic structure
 ___ Alter or remove features/elements of a historic setting or environment (i.e. terrain)
X Add nonhistoric features/elements (i.e. visual, audible, or atmospheric) to a historic setting or cultural landscape into rep
 Buttrick
X Disturb, destroy, or make archaeological resources inaccessible, or alter terrain
 ___ Potentially affect presently unidentified cultural resources
 ___ Begin or contribute to deterioration of historic fabric, terrain, setting, landscape elements, or archaeological or ethnographic resources
 ___ Involve a real property transaction (exchange, sale, or lease of land or structures)
 ___ Other (please specify) _____
6. Measures to prevent or minimize loss or impairment of historic/prehistoric fabric, setting, integrity, or data:
 Only the work described herein will be performed. As much of that will be within the existing road prism there will be no loss or impairment of historic/prehistoric fabric, setting, integrity, or data. Excavation for the buttress will be monitored by park cultural resources personnel to retrieve possible archaeological evidence.
7. Supporting Study Data: (attach if feasible; if action is in a plan, give name and project or page number):
- Available upon request in the Historian's office, Wicksburg National Military Park. Request Project PRA-WICK 1011
8. Attachments: (X) Map () Archeological Clearance, if applicable () Drawings () Specifications
 (X) Photographs () Scope of Work () Site plan () List of Materials () Samples
 () Other _____

National Parks 2/2/2005 1:49 PM PAGE 6/018 Fax Server

Prepared By Terrence J. Wischel Date 12/09/04

Title Historian Telephone 601-619-2808

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- B. PARK 106 COORDINATES REVIEW AND RECOMMENDATIONS** (completed by the park Section 106 coordinator)
- 1. Review by additional specialists:** The park is requesting review by specialists as indicated in check-off boxes in Part C.
- 2. Assessment of Effect:**
 _____ No Effect _____ No Adverse Effect _____ Adverse Effect
- 3. Compliance requirements:** (The following is the park's assessment of Section 106 process needs and requirements for this undertaking.):
- (X) A. STANDARD 36 CFR PART 800 CONSULTATION**
 Consultation under 36 CFR Part 800 is needed subsequent to preparation and review by appropriate GNM advisers of this form.
- [] B. PROGRAMMATIC EXCLUSION**
 The above action meets all conditions for a programmatic exclusion under Stipulation IV of the 1995 Servicowide PA for Section 106 compliance.
APPLICABLE EXCLUSION: Exclusion IV.B ____ (Specify 1-13 or IV.C addition to the list of exclusions.)
- [] C. PLAN-RELATED UNDERTAKING**
 Consultation and review of the proposed undertaking were completed in the context of a plan review process, in accordance with the 1995 Servicowide PA and 36 CFR Part 800.
- [] D. UNDERTAKING RELATED TO ANOTHER AGREEMENT**
 The proposed undertaking is covered for Section 106 purposes under another document such as a statewide agreement established in accord with 36 CFR Part 800.7 or counterpart regulations.
- [] E. STIPULATIONS/CONDITIONS**
 Following are listed any stipulations or conditions necessary to ensure that the assessment of effect above is consistent with 36 CFR Part 800 criteria of effect or to mitigate potential adverse effects.

Recommended by: Terrence J. Winschel, Nisterian
 Name and title of park Section 106 coordinator

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C. REVIEWS BY CULTURAL RESOURCE SPECIALISTS

I have reviewed this proposal for conformity with requirements for the Section 106 process, with the 1905 Service-wide Programmatic Agreement (if applicable), and applicable parts of the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, NPS Management Policies, and NPS-28. Below or attached is my best professional advice about this project and about issues relevant to the Section 106 process, including identification and evaluation of historic properties, assessment of the effects of this undertaking on historic properties, further review by the SHPO and Advisory Council, and mitigation and consultation on any potential adverse effects.

DIACHRONIC

Name: George Smith BEAC

Date:

Comments:

Check if project does not involve ground disturbance ()

Assessment of Effect: ☐ No Effect ☐ No Adverse Effect ☐ Adverse Effect ☐ Programmatic Exclusion

Recommendations for conditions or stipulations:

DIACHRONIC LANDSCAPE ARCHITECT

Name: Ron Goto

Date: 1-3-05

Comments:

None.

Assessment of Effect: ☐ No Effect on historic/cultural landscapes ☒ No Adverse Effect ☐ Adverse Effect☐ Programmatic Exclusion

Check if project meets Secretary's Standards ()

Recommendations for conditions or stipulations:

DIACHRONIC

Name:

Date:

Comments:

Assessment of Effect: ☐ No Effect ☐ No Adverse Effect ☐ Adverse Effect ☐ Programmatic Exclusion

Recommendations for conditions or stipulations:

DIACHRONIC

Name:

Date:

Comments:

Assessment of Effect: ☐ No Effect ☐ No Adverse Effect ☐ Adverse Effect ☐ Programmatic Exclusion

Recommendations for conditions or stipulations:

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I HISTORIAN

Name:

Date:

Comments:

Assessment of Effect: ☐ No Effect ☐ No Adverse Effect ☐ Adverse Effect ☐ Programmatic Exclusion
Recommendations for conditions or stipulations:**IX HISTORICAL ARCHITECT:**

Name: Dennis McCarthy A/I/ MRJ

Date: 12/30/04

Comments:

I REVIEWED THE PROJECT & HAVE NO COMMENTS.

Assessment of Effect: ☐ No Effect on historic structures ☒ No Adverse Effect ☐ Adverse Effect
☐ Programmatic Exclusion
Check if project meets Secretary's Standards ()
Recommendations for conditions or stipulations:**I OTHER ADVISERS**

Name:

Date:

Comments:

Assessment of Effect: ☐ No Effect ☐ No Adverse Effect ☐ Adverse Effect ☐ Programmatic Exclusion
Recommendations for conditions or stipulations:**D. SUPERINTENDENT'S APPROVAL**

The proposed work conforms to NPS Management Policies and NPS-28 and I approve the recommendations, stipulations or conditions noted in Section II of this form.

Name/Signature of Superintendent Monika Mayr
Date 1-28-05



As the nation's principal conservation agency, the Department of the interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protection our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. Administration.

